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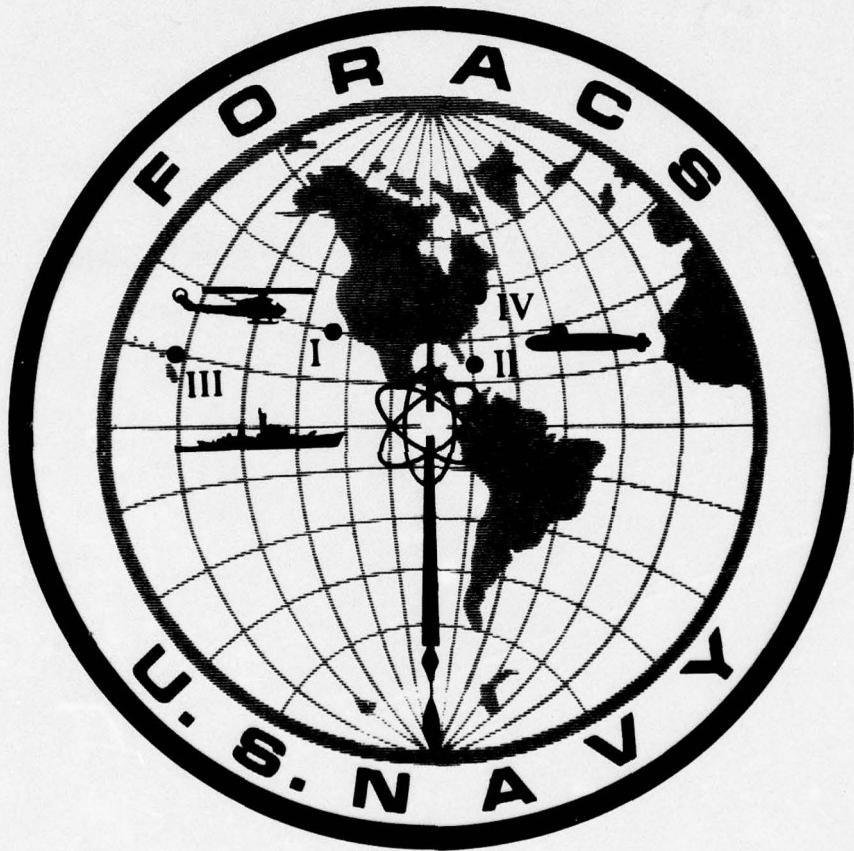
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# FORACS DATA BANK MANUAL



HM Blanchard

15 OCTOBER 1976

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## PREFACE

Material contained in this publication was prepared by members of FORACS Operational Support Division of the Naval Electronics Laboratory Center under program element 60000N, project SEA, task area QMN and NELC work unit R112. This document was approved for publication on 15 October 1976. *pe*

## CONTENTS

INTRODUCTION . . . page 1
NELC FORACS TAPE LIBRARY . . . 1
NELC FORACS Data Bank Field Layout . . . 1
DATA EDITING AND HEADER INSERTION . . . 7
Standard-Card Format . . . 19
Editing Functions . . . 21
Editing Card Documentation . . . 21
ED AND INSERT Sample Printouts . . . 23
DATA BANK PROGRAMS . . . 42
COMPUTE SENSOR ERROR Program . . . 42
SUMMARY DATA BANK Program . . . 78
LIST AND PLOT Program . . . 80
OTHER PROGRAMS . . . 87
COMPOSITE CURVE Program . . . 87

## ILLUSTRATIONS

1. FORACS data bank . . . page 2
2. NELC data bank records . . . 3
3. ED AND INSERT processing procedure . . . 7
4. Periscope benchmark checks . . . 18
5. Gun fire-control system benchmark checks . . . 18
6. Standard card format . . . 19
7. A card format . . . 21
8. B card format . . . 21
9. C card format . . . 21A
10. D card format . . . 21A
11. E card format . . . 22
12. P card format . . . 22
13. K card format . . . 22A
14. R or I card format . . . 22A
15. Card assembly for editing . . . 23
16. ED AND INSERT listing . . . 24
17. Critique function using COMPUTE SENSOR ERROR output . . . 42
18. COMPUTE SENSOR ERROR outputs . . . 43
19. COMPUTE SENSOR ERROR program output . . . 46
20. SUMMARY DATA BANK program output . . . 78
21. LIST AND PLOT listing . . . 81
22. LIST AND PLOT sample plots . . . 84
23. COMPOSITE CURVE plot listing . . . 88
24. COMPOSITE CURVE plot . . . 89

## TABLES

1. Material required from ranges . . . page 1
2. Plot codes . . . 6
3. Vehicle header card for ships and submarines . . . 8
4. Sensor descriptors . . . 9
5. Gyrocompass/SINS equipment header card . . . 11
6. Surface-ship sonar equipment header card . . . 12
7. Submarine sonar equipment header card . . . 13
8. Gun fire-control system equipment header card . . . 14
9. Surface-search radar equipment header card . . . 15
10. ESM equipment header card . . . 16
11. Pelorus equipment header card . . . 16
12. Periscope equipment header card . . . 17
13. Data bank record, gyro errors . . . 43
14. Data bank record, bearing errors . . . 44
15. Data bank record, range errors . . . 44
16. Data bank record of periscope alignment error and lost motion from calibration test data . . . 45
17. Data bank record of periscope benchmark alignment . . . 45
18. Data bank record of gun fire-control benchmark checks . . . 45
19. Summary data bank card punching . . . 79

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## INTRODUCTION

The Fleet Operational Readiness Accuracy Check Site (FORACS) program was established to determine the range and/or bearing accuracy of various ship sensors: gyrocompass, sonar, gun fire-control system, surface-search radar, pelorus, and periscope. FORACS ranges currently in operation are located at San Clemente Island, California, St. Croix, Virgin Islands, Oahu, Hawaii, Fishers Island, New York, and Andros Island in the Bahamas. These ranges collect sensor information and report results to the ship and others in the Navy community.

Test data come to NELC in the form of magnetic tape, computer listings, and bound reports. At NELC the incoming data are reprocessed and retrieval programs allow these data to be extracted in a variety of computer sorts. Special reports can be generated with the addition of minimum amounts of new software. Summary information is published at regular intervals to give an updated history of sensor performance.

## NELC FORACS TAPE LIBRARY

Information for the NELC FORACS tape library is submitted by the ranges in the forms shown in table 1. After checking, this information is entered into the NELC computer and is maintained in mark-by-mark, interval, and summary files in the data bank (figure 1). Mark-by-mark files consist of all individual bearing and range errors for each sensor tested. Interval files consist of bearing- and range-error parameters for bearing sectors and range intervals. Summary files consist of statistical parameters computed for each sensor and are used for producing summary reports.

Once the range data have been checked for accuracy, the three files are merged into the library for permanent storage. Thus, the files are being continually expanded as additional ship tests are performed. Programs are available in the NELC computer to edit the files should erroneous information be discovered in them or if it becomes necessary to change any particular file.

Data may be retrieved from the files by equipment type, ship name, ship class, FORACS range number, or other desired parameters. As data are extracted in this manner, they are merged on a scratch tape for ease in providing answers to special queries.

TABLE 1. MATERIAL REQUIRED FROM RANGES.

---

Bound volume of the test report
Computer listings from programs DAY, ED, NORM, GSE, and PERCAL (for submarines)
Magnetic tapes containing data from the programs NORM, ED, GSE, and PERCAL (for submarines)

---

## NELC FORACS DATA BANK FIELD LAYOUT

The NELC FORACS data bank makes use of the fields shown in figure 2. The following is a discussion and description of these fields.



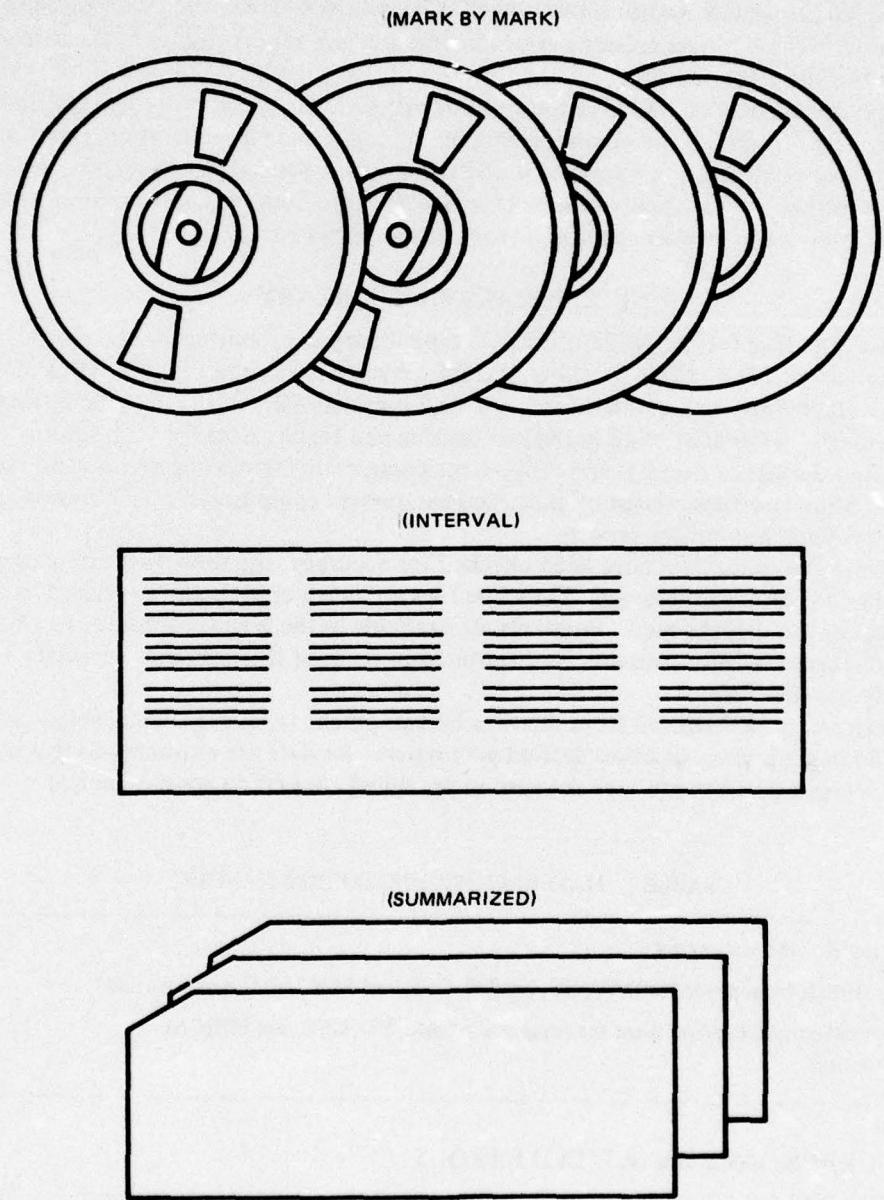


Figure 1. FORACS data bank.

Figure 2. NELC data bank records.

### **EDIT CODE**

If the edit-code field is left blank it indicates that both range and bearing errors are valid; if a '1' is placed in this field, the range error is valid and the bearing error is not valid or has not been taken; if a '2' appears in this field, the bearing error is valid and the range error is not valid or has not been taken; and if a '3' appears in this field neither range nor bearing errors are valid.

### **MARK NUMBERS**

Mark numbers may be in the range from '1' through '999'.

### **TRUE BEARING**

This is the computed true bearing of the sensor.

### **RANGE NUMBER**

This field always contains the number of the FORACS range performing the test.

### **REPORT NUMBER**

This field contains the number assigned to the report of the tests being processed.

### **SENSOR DESCRIPTOR**

The sensor descriptor number (see table 4) should be placed in this field.

### **TIME**

Time is in hours and hundredths.

### **BEARING**

This is the computed relative bearing of the sensor (except for gyro/SINS it is the computed true bearing, ie, ship's heading).

### **BEARING SIGN AND ERROR**

The sign for this field is ‘-’ for negative errors, ‘blank’ for zero and positive errors. The error value may be relative, true, or normalized (relative or true) as appropriate for the particular sensor. If bearing data were not taken this field contains a ‘0’.

### **SIMULATED RANGE**

This field contains the computed range to the target plus any range simulated by time delay (ie, the range that the sensor should have read for zero error). This field contains a ‘0’ if range data were not taken.

### **COMPUTED RANGE**

This field contains the range computed from the target’s on-range coordinates and the sensor’s computed on-range coordinates. This range is a repeat of the simulated range if transponding equipment is not used for introducing time delays. This field contains a ‘0’ if range data were not taken.

### **RANGE SIGN AND ERROR**

In this field the sign is ‘-’ for negative errors, ‘blank’ for zero and positive errors. This field contains a ‘0’ if range data were not taken.

### **PLOT CODE**

In this field the plot code (see table 2) is inserted.

All bearing data have two decimal places assumed and are in degrees and hundredths. All range data have zero decimal places assumed and are in whole yards. All fields are right-justified and are output without leading zeroes. It should be noted that the ‘-’ sign for negative errors may be placed only in positions 43 or 65. The error magnitude is then right-justified as a positive value in the appropriate columns.

TABLE 2. PLOT CODES.

SONAR			
1st Digit	Meaning	Meaning (Coast Guard) Indicate by '1' in cc 80 of Vehicle Header Card	Meaning BQS-11, 12, 13
1	Passive	Passive	(5) 0-10K
2	1K R.S.	600 yd R.S.	(7) 10K-20K
3	2.5K R.S.	1.5K R.S.	(9) 20K-30K
4	5K R.S.	3.7K-4K R.S.	
5	10K R.S.	6K R.S.	0-10K (ODT; BBT zero-zone start)
6	15K R.S.	2K R.S.	
7	20K R.S.	8K R.S.	10-20K (ODT; BBT zero-zone start)
8	40K R.S.	16K R.S.	BBT-10K zone start
9	25K R.S.		20-30K (ODT; BBT zero zone start)
2nd Digit	Mode	Meaning	Type of Run
1	DIFF		Range
2	DIFF		Bearing
5	SUM		Range
6	SUM		Bearing
GUN FIRE CONTROL SYSTEM			
First digit must always be '1'		Second Digit	Meaning
		1	Automatic track passive target
		2	Automatic track active target
		3	Manual track passive target
		4	Manual track active target
SURFACE SEARCH RADAR			
1st Digit	Meaning		
1	7K full scale range (3.5 mi)		
2	8K full scale range (4 mi)		
3	10K full scale range (5 mi)		
4	20K full scale range (10 mi)		
5	40K full scale range (20 mi)		
6	60K full scale range (30 mi)		
7	15K full scale range		
8	30K full scale range		
PELORUS			
First digit=second digit of Sensor Descriptor			
ESM			
First digit=band number (1 through 9)			

## DATA EDITING AND HEADER INSERTION

The magnetic-tape data files received from the ranges must be edited and be provided with header information. The program which performs this function is called ED AND INSERT. A flow diagram of this process is shown in figure 3. The editing commands and header information are punched on IBM cards and are merged with the mark data from the range magnetic tape. This program produces a composite magnetic-tape record (mark-by-mark) of identifiable test information.

Vehicle record information is obtained from the range report of the tests. When the information is keypunched, a vehicle-header record precedes all of the data for one

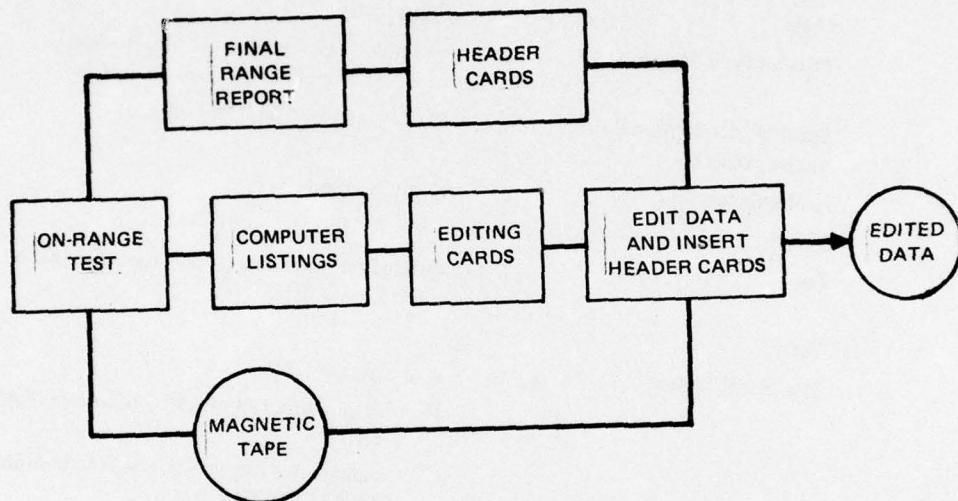


Figure 3. ED AND INSERT processing procedure.

complete test. This record identifies the ship by name, hull number and type, and the FORACs range making the test. The date of the test, and the report number (sequentially assigned to each report) are also placed in this record together with any other information pertinent to special tests. Table 3 lists the information contained in the vehicle records and the card columns assigned to each item.

Equipment header records are used to identify the data for each sensor. These records precede the sensor data entries. A code is used which carries unique information in the form of a triad consisting of the range number, the report number, and the sensor "descriptor" number. This latter number is a two-digit one which identifies the sensor under test. Table 4 lists the descriptors assigned to US sensors. In addition to the triad coding, the equipment header record contains the nomenclature of the sensor and other information pertinent to the test.

TABLE 3. VEHICLE HEADER CARD FOR SHIPS AND SUBMARINES.

IBM Card Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	Blank or 00 = vehicle header card
13-36	Vehicle name	Right justified
38-41	Class	Right justified
42	Mission type designation	Example: G = guided missile; R = radar picket; B = ballistic missile
43	Specifies conventional or nuclear vehicle	Blank = conventional; N = nuclear
45-49	Hull number	Right justified
51-52	Month	
53-54	Day	Date of on-range test (if on range 2 days, use second day's date)
55-56	Year	
78	Test identification	A = WSAT B = diagnostics run at SACS before FORACS test C = diagnostics run at SACS before combined FORACS/WSAT test
79	Reference instrument for test (submarine)	P = periscope; D = deck transit; B = both
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = helicopter; 3 = foreign; 9 = submarine

Each type of sensor (gyrocompass, radar, sonar, etc) has its own unique header-record format. These formats and the information which is coded and retained for US equipment are shown in tables 5 through 12. During the dockside portion of FORACS tests, alignment and lost-motion checks are made on periscopes and gun fire-control systems. These results are contained in the bound range report. In order to put this information into the data bank, cards are punched as shown in figures 4 and 5.

Benchmark checks taken at dockside on periscopes (alignment error and lost-motion values) are placed on periscope header cards (clockwise motion, ie, descriptors 73 and 75) in decimal degrees. The appropriate columns are shown in figure 4. For gun fire-control benchmark checks, alignment-error and lost-motion values are entered in hundredths of minutes on a gun fire-control system header card with a '3' in column nine (fig 5).

TABLE 4. SENSOR DESCRIPTORS.

GYROCOMPASS/SINS (Surface ship or submarine)

- 10 = Settled error (immediately precedes on-range data for same gyro)
- 11 = Forward master
- 12 = Aft auxiliary
- 13 = Gyro CW\*
- 14 = Gyro CCW\*
- 15 = SINS CW\*
- 16 = SINS CCW\* or SQS-35 gyro deployed
- 17 = SQS-35 transducer gyro in cradle
- 18 = SINS multi-speed repeater
- 19 = SINS console

\*In-harbor tests – data taken during periscope calibration test

SURFACE SHIP SONAR (Except SQS-35)

- 21 = Console
- 22 = Other than console or computer
- 23 = Data computer or converter (or Unit 14 or 23 of SQS-26)
- 34 = Synchro monitor (not used when "recorded at data converter using a SYMON" – only when SYMON is used with manual compensating switch)
- 38 = TRR (Tactical Range Recorder)

SQS-35 SONAR

- 21 = Unit 1, normalized relative bearing
- 22 = Unit 1, true bearing (not norm)
- 23 = Unit 3, normalized relative bearing
- 24 = Unit 3, true bearing (not norm)

SUBMARINE SONAR

- 24 = TDC
- 25 = Console or control indicator
- 26 = Analyzer
- 27 = Compensator 1 (passive)\*
- 28 = Compensator 2 (active or two-track)\*
- 29 = Computer indicator (BQA-3\*\* of BQS-6 or BQS-11, 12, 13; Auxiliary Active Digital Display\*\* of BQS-11, 12, 13)
- 31 = Signal data converter
- 32 = Bearing and range indicator Mk 4
- 33 = Position keeper
- 34 = Synchro monitor
- 35 = Unit 13 of BQS-6 or Unit 18 of BQS-11, 12, 13 or Amplifier Scanner Unit 3 of BQR-7
- 36 = Angle solver

\*Use only if read directly at compensator, not if read at Unit 13 or Unit 18.

\*\*BQA-3 or AADD will appear as nomenclature on equipment header card.

TABLE 4 (Continued)

HELICOPTER SONAR

39 = Helicopter sonar

GUN FIRE CONTROL SYSTEM

41 = Main system (director, barbette, console)

42 = Main system (computer readouts)

43, 45, 47, 49, 51 = Other systems (director)

44, 46, 48, 50, 52 = Other systems (computer)

57 = Second gunmount

58 = Gunmount

59 = NTDS

SURFACE SEARCH RADAR

61 = Master indicator (CIC)

62-67 = Other indicators

68-69 = NTDS

PERISCOPE

71 = Scope #1 on-range

72 = Scope #2 on-range

73 = Periscope calibration - scope #1-CW

74 = Periscope calibration - scope #1-CCW

75 = Periscope calibration - scope #2-CW

76 = Periscope calibration - scope #2-CCW

PELORUS - (Normalized True Bearing Error)

81 = Port

82 = Starboard

83-84 = Others

85 = Centerline

PELORUS - (Relative Bearing Error)

86 = Centerline

87 = Port

88 = Starboard

89 = Others

PUFFS

91-94

ESM

95

RDF

96

BRD-7

97

TABLE 5. GYROCOMPASS/SINS EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
29-32	GYRO or SINS	
34-36	Mark number (digits)	Right justified*
37-38	Mark number (letters)	Left justified*
40-41	Mod number (digits/letters)	Right justified*
42	Mod number (letters/digits)	
44-48	Settled error (hundredths)	Codes for no data (cols. 45-46): 99 = Test not performed (always used with sensor descriptor 16 for SQS-35); 97 = Test performed incorrectly (or insufficient data); 95 = gyro not settled
68	Why equipment not tested or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; U = SQS=35 gyro unsettled when deployed (use only with sensor descriptor 16)
71	Adjustment code	A = bearing data taken before adjustment; J = bearing data taken after adjustment; blank = no adjustments made during test
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = Helicopter; 3 = foreign; 9 = submarine

\*Gyro designation

TABLE 6. SURFACE-SHIP SONAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	I = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type run	I = Range runs; 2 = Bearing runs; 3 = no data; Blank = both range & bearing runs
10-16	Range scale in yards	Right justified
28-32	SONAR	
34-36	Digits	Right justified*
37-38	Letters	Left justified*
45	Process with or w/o baffle limits	Blank = normal baffle limits; B = no baffle limits
46	MIK or modification	M = MIK (or modification); W = without MIK or mod
47	Mounting position	B = bow mounted; blank = dome mounted
48	Signal processing	S = SUM; D = DIFF; B = both
49	Active or Passive mode	Blank = Active; P = passive
50-52	Sector width (degrees)	Number if only one sector width was used; V = sector width was varied (52)
54-57	Sound speed ft/sec	
62-64	Pulse length in ms	Number if given, otherwise use col. 64; C = short; M = medium; G = long; A = combinations
65-67	Mode	RDT, SDT, (SQS-23); ODT, BBT (SQS-26); FHS SHS (SQS-35); OMN, ATT (SQS-38)
68	Why equipment not tested, or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ships request; U = SQS-35 gyro unsettled when deployed invalidates bearing data; Q = when one header card serves to identify more than one file, indicates one of the files is invalid
71	Adjustment codes	Blank = no adjustments made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range & bearing before the adjustment; L = both range & bearing after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 3 = foreign

\*Sonar type designation (SQQ-23 PAIR = 23P)

TABLE 7. SUBMARINE SONAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS Range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type run	1 = Range runs; 2 = Bearing runs; 3 = no data; Blank = both bearing & range runs
10-16	Range scale in yds	Right justified
30-32	Nomenclature	Sonar nomenclature (e.g., BQR, BQS, BQA)* If BQS-6 or BQS-11, 12, 13 read at BQA-3, use BQA-3 nomenclature designation; same for AADD.
34-36	Digits	Right justified*
37-38	Letters	Left justified*
45	Process with or w/o limits	Blank = normal baffle limits; B = without baffle limits
46	Modification	M = modified (or with field change); W = without modification
47	Mounting position	B = bow mounted; blank = dome mounted
48	Signal processing	S = SUM; D = DIFF; B = both
49	Active or Passive mode	A = active; P = passive; T = two track
54-57	Sound speed ft/sec	
62-64	Pulse length in ms	Number if given; otherwise use col. 64; C = short; M = medium; G = long; A = combination
65-67	Mode (when given)	ATF (BQR-2, 7, BQS-6 Pass.) G (gated) or N (normal) in col. 65 for BQS-11, 12, 13 Active; blank = combination of modes
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header serves to identify more than one file, indicates one of the files is invalid.
71	Adjustment code	Blank = no adjustments made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range & bearing data before adjustment; L = both range and bearing data after adjustment
80	Type vehicle	9 = submarine

\*Sonar type designation

TABLE 8. GUN FIRE-CONTROL SYSTEM EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type data	1 = range only; 2 = bearing only; 3 = no data; blank = both bearing and range
29-32	GFCS	
34-36	Digits	Right justified*
37-38	Letters	Left justified*
44	Mode	Tracking mode for range data: T = auto track; M = manual track; B = both
56-60	Alignment error	in hundredths of minutes**
62-66	Lost motion	in hundredths of minutes**
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one or more of the files is invalid.
71	Adjustment codes	Blank = no adjustment made during test; A = bearing data before adjustment; J = bearing data after adjustment; B = range data before adjustment; K = range data after adjustment; C = both range and bearing before adjustment; L = both range and bearing after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 3 = foreign

\*GFCS designation

\*\*Benchmark checks (make a separate header card for benchmark checks - use a "3" in column 9)

TABLE 9. SURFACE-SEARCH RADAR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
9	Type data	1 = range only; 2 = bearing only; 3 = no data; blank = both bearing and range
10-16	Range scale in yards	Right justified. Should appear on header card only if all data were taken on same range scale.
25-32	<b>SS RADAR</b>	<u>Surface ships only</u>
OR		
30-32	Radar nomenclature	<u>Submarines only (BPS, SS - right justified)</u>
34-36	Digits	Right justified*
37-38	Letters	Left justified *
40-41	Digits	Right justified**
42	Letters	
68	Why equipment not tested or not used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing (or normalized true bearing error given); I = insufficient data; semi-color; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
71	Adjustment code	Blank = no adjustment made during test; A = bearing data taken before adjustment; J = bearing data taken after adjustment; B = range data taken before adjustment; K = range data taken after adjustment; C = both range & bearing data taken before adjustment; L = both range & bearing data taken after adjustment
80	Type vehicle	Blank = surface ship; 1 = Coast Guard; 2 = helicopter; 3 = foreign; 9 = submarine

\*Radar designation

\*\*Radar indicator (enter only if AN/SPA- indicator)

TABLE 10. ESM EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	95 = ESM; 96 = RDF; 97 = BRD-7
14	Band designation	Lowest band no. used
26-28	ESM	Alphanumeric input for identification
30-32	TYPE	WLR or BLR, RDF, BRD
34-36	NUMBER DIGITS	ESM identification - right justified
37	LETTER	ESM identification
39-42	Antenna type	Digits only - right justified
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
80	Type vehicle	1 = Coast Guard; 3 = foreign; 9 = submarine; blank = surface ship

TABLE 11. PELOPUR EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
25-32	PEL ALID	Alphanumeric input for pelorus alidade
34-36	Mark number	Alidade designation - right justified
40-41	Mod number	Alidade designation - right justified
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request; Q = when one header card serves to identify more than one file, indicates one of the files is invalid.
80	Type vehicle	1 = Coast Guard; 3 = foreign; blank = surface ship

TABLE 12. PERISCOPE EQUIPMENT HEADER CARD.

Column	Data	Remarks
1	Specifies header card	1 = header card
2	FORACS range number	
3-6	Report number	Right justified
7-8	Sensor descriptor	
30-32	PER	
34-36	Digits	Right justified*
37-38	Letters	Left justified *
40-42	Readout	Left justified – Analyzer = AN (e.g., Analyzer B = ANB) TDC, Position Keeper = PK; Bearing Transmitter = BT; Angle S Solver = AS; Periscope Ring = PR; Synchro Monitor = SYM (before 1 Oct 72). After Oct. 1 72, any symon used is SEACO SYMON; indicate by adding "S" to first two letters of designation for indicator the symon was used to read (ANS, PKS, etc.)
44-48	Low power alignment error	Benchmark checks; enter on "clockwise" header cards (descriptors 73 & 75) in hundredths of degrees. Leave blank if not read. Minus sign for AE in columns 45-46.
50-54	Low power lost motion	
56-60	High power alignment error	
62-66	High power lost motion	
68	Why equipment not tested or used in FORACS data bank	F = FORACS malfunction; E = equipment malfunction; W = weather; N = no reason given; T = taken in true bearing; I = insufficient data; Z = data not retrievable; R = other reasons; S = ship's request
71	Adjustment code	Blank = no adjustments made during the test; A = bearing data taken before adjustment; J = bearing data taken after adjustment
80	Type vehicle	9 = submarine

\*Periscope designation

LO POWER				HI POWER			
A.E.	L.M.	A.E.	L.M.	A.E.	L.M.	A.E.	L.M.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80							

**A.E. — ALIGNMENT ERROR**  
**L.M. — LOST MOTION**  
**MINUS SIGN (IF APPLICABLE) COLUMNS 44 AND 56**

Figure 4. Periscope benchmark checks.

'3'							
A.E.	L.M.	A.E.	L.M.	A.E.	L.M.	A.E.	L.M.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80							

**MINUS SIGN (IF APPLICABLE) COLUMN 56**

Figure 5. Gun fire-control system benchmark checks.

Data associated with each mark are punched in standard format and are divided into nine fields as shown in figure 6.

### STANDARD-CARD FORMAT

The following is a brief discussion of the standard-card fields and the type of information which is punched. It should be noted that all bearing data assume two decimal places and are expressed in degrees and hundredths of a degree. All fields are right-justified. Also to be noted is that the sign '-' for negative errors may be placed only in positions 43 or 65. The error magnitude is then right-justified as a positive value in the appropriate field.

#### EDIT CODE

This code field is left blank if the range and bearing errors are valid. A '1' is punched if the range error is valid but the bearing error is not or has not been taken. A '2' is punched if the bearing error is valid but the range error is not or has not been taken, and a '3' is punched if both errors are invalid.

#### MARK NUMBER

Mark numbers are punched in the range from '1' through '999'. This field is always right-justified.

#### REPORT NUMBER

The number assigned to the test report is punched in this field.

	1	2	3	4	5	6	7	8	9
E MARK	R R S	TIME	B E	BEARING ERROR	SIMULATED RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE	
D NO.	A E E								
G	0 0 0 0 0 0 0 0 0 0	N 0 0 1 P 0 0 0 N	0 0 0 0 0 0 0 0 0 0	A 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
O	0 0 0 0 0 0 0 0 0 0	O 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0
E	1 1 1 1 1 1 1 1 1 1	E 1 1 1 1 1 1 1 1 1	O 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1	I 1 1 1 1 1 1 1 1 1
T	0 0 0 0 0 0 0 0 0 0	T 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0	R 0 0 0 0 0 0 0 0 0
D	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2	2 2 2 2 2 2 2 2 2 2
E	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3	3 3 3 3 3 3 3 3 3 3
E	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4	4 4 4 4 4 4 4 4 4 4
E	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5	5 5 5 5 5 5 5 5 5 5
E	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6	6 6 6 6 6 6 6 6 6 6
E	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7	7 7 7 7 7 7 7 7 7 7
E	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8	8 8 8 8 8 8 8 8 8 8
E	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9	9 9 9 9 9 9 9 9 9 9

Figure 6. Standard card format.

### **TIME**

Time is punched in hours and hundredths of hours.

### **SENSOR DESCRIPTOR**

The number, taken from table 4, which identifies the sensor is punched in this field.

### **BEARING**

This number represents the computed relative bearing of the sensor (except for gyro/SINS, it is the computed true bearing, ie, ship's heading).

### **BEARING SIGN AND ERROR**

The sign “-” is used for negative errors and a blank is left in this field for zero and positive errors. The error value may be relative, true, or normalized (relative or true) as appropriate for the particular sensor. If bearing data were not taken, an “0” is punched in this field.

### **SIMULATED RANGE**

This is the computed range to the target plus any range simulated by time delay (the range that the sensor should have read for zero error).

### **ACTUAL RANGE**

This is the range computed from the target's on-range coordinates. This is a repeat of the simulated range if transponding equipment was not used for introducing time delays.

### **RANGE SIGN AND ERROR**

The sign “-” is used for negative errors and a blank is left for zero and positive errors. If no range data were taken a “0” must be punched in this field.

### **PLOT CODE**

The plot code number, taken from table 2, contains three digits and is used to identify range scales, zone start information, and other variables.

## EDITING FUNCTIONS

The editing portion of the program allows any desired changes to be made to the magnetic-tape data. Changes can be made to any field to replace the entire mark, remove it, or to accept only selected data. In addition, editing cards can be used to delete specific data from statistical analyses without disturbing the permanent magnetic-tape record.

Setting of upper and lower limits on data values can also be accomplished with editing cards so as to exclude from statistical analyses any values which are not true indicators of equipment performance. These values are termed "outliers" and may be caused by incorrect readings, typographical errors, tracking of the wrong target, or other events. The editing program also permits the identification and retention of data collected beyond sonar baffle limits.

## **EDITING CARD DOCUMENTATION**

Ten unique cards are used in the editing program. These cards are designated A, B, C, D, E, P, K, R, and I.

A CARD

The A card is used to remove marks from the tape record. If one mark number is to be removed, columns 5 through 8 are used.

A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
B	END																																																																															
E																																																																																
G																																																																																
I																																																																																
N																																																																																
MARK NO.																																																																																

Figure 7. A card format.

B CARD

The B card is used to remove any editing from bearing data outside baffle limits so that the data will appear on the Compute Sensor Listing but will not be used as a valid sonar sector. If an editing card deletes baffle data (because of the limits which were used), the B card is placed after the editing card. Then, if there are outliers in the baffle area, D cards are used to delete.

**B** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80  
**L** U  
**O** P  
**W** P  
**E** E  
**R** R  
**B** B  
**A** A  
**F** F  
**F** F  
**L** L  
**E** E

Figure 8. B card format.

## C CARD

The C card is used to edit by plot codes (setting limits or bounds on data with specific plot codes). When an 'L' is placed in column 2, editing by setting limits will be accomplished. If a 'B' is placed in this column, only bearing will be deleted; if an 'R' is used, only range will be deleted; if an 'A' is used, the data with that plot code will be removed from the tape; and if the column is left blank, both bearing and range will be deleted.

C				- (SIGN) -																
*	P	L	O	T	LOWER	UPPER	LOWER	UPPER	BEARING/RANGE											
C	O	D	E		BOUND	BOUND	BOUND	BOUND												

Figure 9. C card format.

## D CARD

The D card is used to delete marks from computations in subsequent processing. The coded marks will be retained on the tape record. If a 'B' is used in column 2 of this card, only bearing will be deleted. If an 'R' is used, only range will be deleted, and if the column is left blank, both bearing and range will be deleted. To delete one mark number, columns 5 through 8 are used.

D		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80																	
B	END																		
E																			
G																			
I																			
N																			
MARK NO.																			

Figure 10. D card format.

## E CARD

The E card is used to set limits or bounds on bearing or range errors. The marks which fall beyond the limits remain on the tape record but are coded so that they will not be used in any computations in subsequent processing. The E card is also used to clear range or bearing editing in all preceding editing (except for A cards). Therefore, all other editing cards should follow the E card. A 'B' in column 2 clears all bearing editing and an 'R' in this column clears all range editing. For an 'EB' or 'ER' on one mark number, columns 5 through 8 are used.

E		— (SIGN) —											
*	B	END	LOWER	UPPER	LOWER								
E			BOUND										
G													
I													
N													
MARK NO.		BEARING/RANGE											

Figure 11. E card format.

## P CARD

The P card is used to partially replace any information in the standard card format. It can also be used to change the entire data set for information contained in fields 1 and 2, including the same information on the equipment header record (card). In column 2, '1' is the range number replacement, '2' is the report number and sensor descriptor replacement, '3' is the time replacement, '4' is bearing replacement, '5' is bearing error replacement, '6' is adjusted range replacement, '7' is actual range replacement, '8' is range error replacement, and '9' is plot code replacement. To partially replace only one mark number, columns 5 through 8 are used. When replacing a range or report number or a sensor descriptor (changing fields 1 or 2) the header card and all the data cards will be changed by leaving columns 5 through 12 blank. If no mark numbers are entered for any P card, the field replaced will be changed for all marks.

P		1	2	3	4	-5	6	7	8	9				
*	B	END	R	R	S	TIME	B	B	E	A	R	ACTUAL	RANGE	9
E		A	E	E			E	E	R	D	A	RANGE	ERROR	P
G		N	P	N			A	A	R	J	N			L
I		G	O	S			R	R	O	U	G			T
N		E	R	O			I	I	R	S	E			C
			T	R			N	N		T				O
							G	G		E				D
										D				E
MARK NO.														

Figure 12. P card format.

## K CARD

The K card is used when data run together and must be separated (when sensors are given the same sensor descriptor number and are run back-to-back on the tape file). The K card is the header card for the second group of data. For example, tape descriptor 40 contains bearing data taken at a gun mount (descriptor 58) and range data taken at a director (descriptor 41). Marks 1 through 58 and 102 through 385 represent gun-mount data and marks 59 through 101 and 386 through 422 represent director data. Editing is accomplished as follows: prepare a P card with '2' in column 2 which changes the descriptor to 58; prepare two A cards to remove marks 59 through 101 and marks 386 through 422; prepare an E card to place limits on gun-mount data; prepare a D card to delete specific gun-mount data; prepare a K card for director data (descriptor numbers will automatically be inserted in individual marks); prepare two A cards to remove marks 1 through 58 and 102 through 385; prepare an E card to place limits on director data; and prepare a D card to remove any specific director data. When the cards are processed they are to be stacked in the order just discussed.

**K** (REGULAR HEADER CARD FORMAT)  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Figure 13. K card format.

## R or I CARDS

An R card is a replacement mark number and an I card is an inserted mark. Both are cut in standard card format except for column 1 which may contain either an 'R' or 'I'. The letter is not critical in this one case because the same routine in the program is used for either 'R' or 'I'. All values should be key-punched for consistency. If, for example, there were no range data, the last columns for adjusted, actual, and error (columns 56, 64, and 72) should contain a '0'. Leading zeroes are not to be key-punched. If, for example, the listing reads -0.08, only '8' is to be on the card. Trailing zeroes are essential, thus 0.50 must be shown on the card as '50' as a bearing error. Whenever any data are replaced or inserted, editing has not been performed. For this reason, the mark should be checked against the desired limits and the proper editing code should be placed in column 3. The edit code for this card (column 3): 'blank' to indicate range and bearing errors are valid, '1' that range error is valid and bearing error is either not valid or has not been taken, '2' that bearing error is valid and range error is either not valid or has not been taken, and '3' that both range and bearing errors are invalid. Alternately, an editing card or cards may be placed following the inserted cards so that they will be properly edited. The order in which the cards are placed is shown in figure 15.

**R** (REGULAR HEADER CARD FORMAT)  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

**I** (REGULAR HEADER CARD FORMAT)  
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

Figure 14. R or I card format.

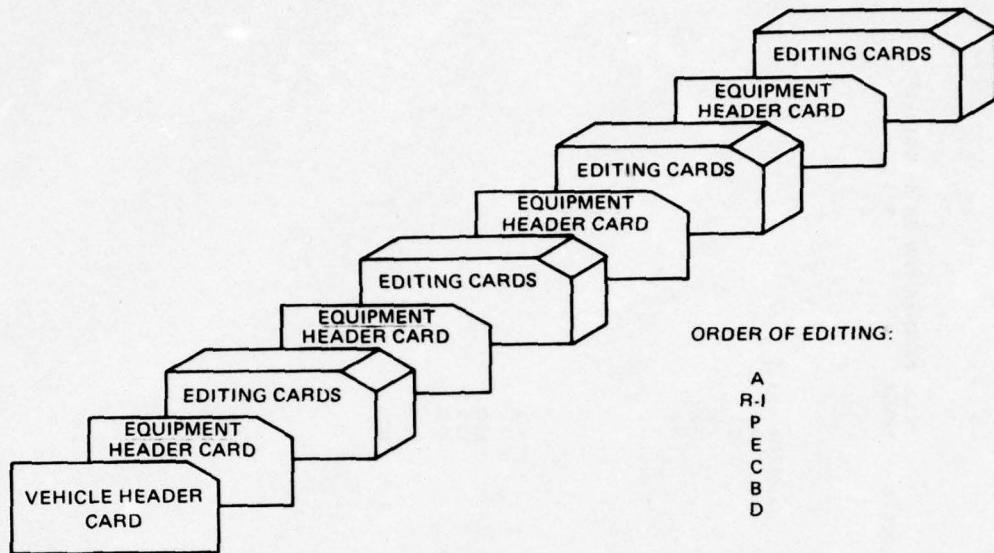


Figure 15. Card assembly for editing.

#### **ED AND INSERT SAMPLE PRINTOUTS**

Listings from the ED AND INSERT program are shown in figure 16. The first page of this figure is a listing of the editing deck showing header cards followed by editing cards. The second page is a listing of header cards generated by the ED AND INSERT program using the information on the preceding header card and dividing the data into appropriate range scales as designated by plot codes. These pages are followed by output listings consisting of vehicle header information followed by editing, equipment headers, and mark-by-mark listings for the following components: gyrocompass (page 26), sonar (pages 27 through 31), GFCS (pages 32 and 33), surface-ship radar (pages 34 through 37), periscope (pages 38 and 39), and peloruses (pages 40 and 41).

EDITING DECK		JOAN CATHERINE		SS 9999 122576		THIS PROGRAM RUN ON 07 OCT 1976 999CB	
17	88800	17	GYRO 999	99A	- 16		
E	888112	-	50	20			
D	6						
D	421						
D	430						
17	88821	10000					
CL	52		SONAR 999CB			M D 50535050	GSOT
CL	3		- 200	100	- 40		90
CL	4				- 10		25
CL	51				- 40		35
CL	7				- 40		90
B	135 225				- 120		40
D	18 19						
DB	311						
DR	489						
17	888412		GFC S 999C				
E	888441		- 36 0				
E	88861		SS RADAK 999A	990	- 27		0
CL	2		- 150	100	- 20		120
CL	3		- 150	100	- 50		120
CL	4		- 150	100	- 140		140
OB	304						
DB	306						
17	888732		PER 999A A&C	- 4	0 - 6	0	9
A	13						
A	22						
P4	17						
P5	17						
E	888742		- 20 5	-	10		9
E			PER 999A ABC				
D	227		- 15 10				
17	88881						
P4	277						
CL	1		PEL ALID 999 99				
CL	2		- 100 0				
D	15		- 100 20				
D	371						

Figure 16. ED AND INSERT listing (part 1).

THIS PROGRAM RUN ON 07 OCT 1976

18 JUNE 1973 VERSION									
17	88800		JOAN	CATHERINE	SS	9999	1222576	999CB	9
17	888112	1.0000	GYRO	999	99A	-	16		
17	888212	25000	SUNAR	999C B	M D	50505050	GSDT		
17	888211	50000	SUNAR	999C B	M D	50505050	GSDT		
17	888211	100000	SUNAR	999C B	M O	50505050	GSDT		
17	888211	200000	SUNAR	999C B	M D	50505050	GSDT		
			GFC S	999C	M D	50505050	GSDT		
			GFC S	999C	T				
			SS RADAR	999A	TP				
			SS RADAR	999A	99D				
			SS RADAR	999A	99D				
			SS RADAR	999A	99D				
			PEK	999A	ABC	-	4	0	0
			PER	999A	ABC				
			PEL ALD	999	99				
			PEL ALD	999	99				

Figure 16. ED AND INSERT listing (part 2).

THIS PROGRAM RUN ON 07 OCT 1976

BEARING LIMITS -DO TO 20 FOR MARKS  
 MARK 6 DELETED FROM COMPUTATIONS  
 MARK 421 DELETED FROM COMPUTATIONS  
 MARK 43C DELETED FROM COMPUTATIONS

17 86800  
 JUAN CATHERINE SS 9999 122576 999C8  
 9  
 1 TIKU 433

SENSOR	I	17 868112	GYRU	999	99A - 16	ADJUST	ACTUAL	RANGE	RANGE	PLOT
			CODE	MARK	SEN	TIME	BEAR	ERROR	ERRR	CODE
			CODE	NUM	RAN	RPT	DES			
2	1	7	888	11	1007	6075	-	15	0	0
2	3	7	888	11	1010	6023	-	15	0	0
2	4	7	868	11	1012	6046	-	16	0	0
2	5	7	868	11	1018	6233	-	13	0	0
3	6	7	666	11	1018	6245	-	35	0	0
2	7	7	388	11	1020	6186	-	11	0	0
2	8	7	888	11	1022	6302	-	11	0	0
2	9	7	368	11	1023	6425	-	17	0	0
2	11	7	888	11	1025	6505	-	14	0	0
2	12	7	888	11	1027	6217	-	12	0	0
2	13	7	986	11	1027	6244	-	15	0	0
2	14	7	668	11	1028	6298	-	18	0	0
2	16	7	888	11	1030	5960	-	5	0	0
2	17	7	868	11	1030	5901	-	12	0	0
3	18	7	888	11	1032	5719	-	151	0	0
2	19	7	888	11	1033	5220	-	20	0	0
2	20	7	868	11	1037	4749	-	14	0	0
2	412	7	888	11	1063	4031	-	14	0	0
2	413	7	868	11	1067	4243	-	18	0	0
2	414	7	888	11	1067	4391	-	11	0	0
2	415	7	868	11	1068	4534	-	18	0	0
2	416	7	868	11	1068	4601	-	21	0	0
2	417	7	888	11	1070	4777	-	19	0	0
2	418	7	868	11	1070	4916	-	21	0	0
2	419	7	888	11	1072	5029	-	19	0	0
3	421	7	888	11	1077	4074	-	9	0	0
2	422	7	888	11	1077	4247	-	22	0	0
2	423	7	888	11	1078	4390	-	28	0	0
2	424	7	888	11	1078	4528	-	19	0	0
2	425	7	888	11	1078	4637	-	20	0	0
2	426	7	888	11	1079	4739	-	17	0	0
2	427	7	866	11	1087	5505	-	19	0	0
2	428	7	888	11	1087	5476	-	14	0	0
3	430	7	888	11	1090	4952	-	20	0	0
2	431	7	868	11	1090	4621	-	11	0	0
2	432	7	888	11	1092	4725	-	17	0	0
2	433	7	888	11	1093	4805	-	17	0	0

Figure 16. ED AND INSERT listing (part 3).

BEARING LIMITS -200 TO 100 FOR MARKS WITH PLOT CODE OF 522  
 RANGE LIMITS -4C TO 9C FOR MARKS WITH PLOT CODE OF 222  
 RANGE LIMITS -10 TO 25 FOR MARKS WITH PLOT CODE OF 322  
 RANGE LIMITS -4C TO 35 FOR MARKS WITH PLOT CODE OF 422  
 RANGE LIMITS -4C TO 50 FOR MARKS WITH PLOT CODE OF 512  
 RANGE LIMITS -120 TO 40 FOR MARKS WITH PLOT CODE OF 777  
 MARKS 10 THRU 15 DELETED FROM COMPUTATIONS  
 BEARING DATA DELETED FROM MARK 311  
 RANGE DATA DELETED FROM MARK 489

SENSOR	2	17	668212	10000	SONAK 999CB	M D	5050-5050	GSDT	ADJUST	ACTUAL	RANGE	RANGE	PLOT	
		EDIT	MARK	SEN	TIME	BEAR	BEAR	BEAR	RANGE	RANGE	ERROR	ERROR	CODE	
		MARK	CODE	RAN	REP	DES								
		2	7	868	21	898	517	-	137	8597	0	68	522	
		3	7	868	21	900	744	-	119	8539	0	66	522	
		4	7	868	21	902	521	-	121	8043	0	59	522	
		6	7	868	21	905	1006	-	66	7920	0	10	522	
		7	7	868	21	907	1041	-	21	7884	0	26	522	
		8	7	868	21	907	1005	-	55	7861	0	13	522	
		9	7	868	21	908	908	-	68	7838	35	35	522	
		10	7	868	21	910	673	-	123	7795	35	35	522	
		11	7	868	21	910	590	-	130	7745	40	40	522	
		12	7	868	21	912	621	-	121	8089	0	26	522	
		13	7	868	21	913	1063	-	23	8029	0	36	522	
		14	7	868	21	915	1124	-	24	7988	0	20	522	
		15	7	868	21	915	1057	-	32	7945	29	29	522	
		16	7	868	21	917	764	-	134	7903	0	22	522	
		17	7	868	21	917	124	-	74	7862	30	30	522	
		18	7	868	21	918	35765	10	7822	66	66	522		
		19	7	868	21	918	35755	65	7782	0	28	522		
		20	7	868	21	920	35941	-	66	7741	0	44	522	
		21	7	868	21	922	423	-	123	8501	54	54	522	
		3	22	7	868	21	922	535	-	245	8463	0	149	522
		312	7	868	21	1443	7471	-	71	8411	0	4	522	
		313	7	868	21	1443	7851	-	91	8413	0	5	522	
		314	7	868	21	1445	8234	-	59	8419	0	1	522	
		315	7	868	21	1445	8589	-	49	8427	0	5	522	
		316	7	868	21	1447	8897	-	22	8438	0	6	522	
		317	7	868	21	1447	9188	12	8451	0	1	522		
		318	7	868	21	1448	9644	-	19	7640	0	32	522	
		319	7	868	21	1450	9843	37	7658	0	44	522		
		320	7	868	21	1450	10163	17	7685	0	20	522		
		321	7	868	21	1452	10395	-	45	7706	42	42	522	
		322	7	868	21	1452	10598	-	23	7728	38	38	522	
		323	7	868	21	1453	10863	-	13	7763	31	31	522	
		324	7	868	21	1455	11079	-	29	7787	47	47	522	
		325	7	868	21	1455	11360	-	10	7814	31	31	522	
		326	7	868	21	1457	11819	-	39	7858	50	50	522	
		327	7	868	21	1458	12113	-	53	7890	49	49	522	
		328	7	868	21	1458	12617	-	47	7937	46	46	522	
		329	7	868	21	1460	12984	-	4	7971	47	47	522	

Figure 16. ED AND INSERT listing (part 4).

SENSOR	3	17 860211				2500				SONAR 999CB				ND				50505050				GSDT			
		EDIT	MARK	RAN	REP	SEN	DES	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	RANGE	RANGE	BEAR	ADJUST	ACTUAL	RANGE	RANGE	PLOT	CODE		
		1	483	7	888	21	1700	112	-	12	2510	0-	5	5	312						11	312			
		1	484	7	888	21	1702	35943	-	18	2472	0	0	0	0	312						0	312		
		3	486	7	888	21	1703	35866	34	0	2347	0	0	0	0	312						18	312		
		1	487	7	888	21	1705	0	-	0	2317	0	0	0	0	312						3	312		
		1	488	7	888	21	1705	21	-	81	2652	0	0	0	0	312						6	312		
		3	489	7	888	21	1708	35950	-	325	2154	-	11	2125	0	0	0	0	0	20	0				
		1	490	7	888	21	1710	71	-	11	2154	-	11	2125	0	0	0	0	0	20	0				
		1	491	7	888	21	1710	27	-	7	2088	0	0	0	0	312						22	312		
		1	492	7	888	21	1712	35992	-	17	2052	0	0	0	0	312						18	312		
		1	493	7	888	21	1712	35978	-	28	2017	0	0	0	0	312						1	312		
		1	494	7	888	21	1713	35951	-	51	1685	0	0	0	0	312						4	312		
		1	502	7	888	21	1723	9b	-	66	1670	0	0	0	0	312						2	312		
		1	503	7	888	21	1723	61	-	21	1658	0	0	0	0	312						8	312		
		1	504	7	888	21	1725	0	-	0	1648	0	0	0	0	312						4	312		
		1	505	7	888	21	1725	35982	-	7	1641	0	0	0	0	312						2	312		
		1	506	7	888	21	1727	35971	-	31	1634	0	0	0	0	312						4	312		
		1	507	7	888	21	1727	35992	-	62	1512	0	0	0	0	312						7	312		
		1	508	7	888	21	1733	87	-	13	1484	0	0	0	0	312						4	312		
		1	509	7	888	21	1735	101	-	21	1454	0	0	0	0	312						5	312		
		1	510	7	888	21	1735	0	-	0	1423	0	0	0	0	312						2	312		
		1	511	7	888	21	1737	35997	-	22	1392	0	0	0	0	312						4	312		
		1	512	7	888	21	1737	29	-	9	1354	0	0	0	0	312						4	312		
		1	513	7	888	21	1738	43	-	18															

Figure 16. ED AND INSERT listing (part 5).

SENSOR	4	17 668211			5000			SONAR 999C8			M D			50505050			GSOT		
		EDIT	MARK	CODE	NUM	RAN	REP	SEN	DES	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	RANGE	PLOT	CODE
1	442	7	888	21	1650	35530	-	20	4658	0	16	412							
1	446	7	888	21	1657	35818	-	8	4502	0	3	412							
1	447	7	888	21	1657	35839	-	9	4471	0	14	412							
1	448	7	888	21	1658	35887	-	53	4442	0	20	412							
1	449	7	888	21	1658	35844	-	24	4412	0	33	412							
1	450	7	888	21	1660	35849	-	9	4383	0	22	412							
1	451	7	888	21	1660	35776	-	49	4351	0	21	412							
1	458	7	888	21	1673	91	-	34	4175	0	30	412							
1	459	7	888	21	1677	43	-	77	3619	0	20	412							
1	460	7	888	21	1678	7	-	117	3469	0	26	412							
1	461	7	888	21	1680	23	-	2	3426	0	4	412							
1	462	7	888	21	1680	26	-	1	3371	0	9	412							
1	463	7	888	21	1682	17	-	77	3318	0	20	412							
1	464	7	888	21	1682	35877	-	2	3280	0	25	412							
1	465	7	888	21	1683	35828	-	53	3242	0	6	412							
1	466	7	888	21	1685	104	-	64	4432	0	17	412							
1	467	7	888	21	1685	0	-	0	4398	0	12	412							
1	468	7	888	21	1687	35905	-	55	4362	0	20	412							
1	469	7	888	21	1688	35950	-	50	4725	0	29	412							
1	470	7	888	21	1688	35938	-	2	4689	0	23	412							
1	471	7	888	21	1690	35904	-	54	4654	0	27	412							
1	472	7	888	21	1692	0	-	0	2903	0	18	412							
1	473	7	888	21	1692	61	-	19	2865	0	13	412							
1	474	7	888	21	1693	35962	-	22	2837	0	13	412							
1	475	7	888	21	1693	35912	-	52	2800	0	25	412							
1	476	7	888	21	1695	35894	-	44	2764	0	21	412							
1	477	7	888	21	1695	35946	-	36	2728	0	28	412							
1	497	7	888	21	1718	35901	-	1	1811	0	6	412							
1	498	7	888	21	1718	35780	-	55	1790	0	35	412							
1	499	7	888	21	1720	35718	-	22	1771	0	6	412							
1	501	7	888	21	1722	63	-	3	1728	0	24	412							

Figure 16. ED AND INSERT listing (part 6).

SENSOR	5	17 8b8211 10000				SONAR 999CB				ND 50505050 GSDT			
		EDIT CODE	MARK NUM	RAN	REP DES	SEN	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
	1	385	7	888	21	1592	359	-	59	9529	0	46	
	1	386	7	888	21	1592	291	-	51	9504	0	66	
	1	387	7	888	21	1593	289	-	49	9481	0	73	
	1	388	7	888	21	1593	298	-	58	9460	0	88	
	1	389	7	888	21	1595	335	-	35	9439	0	66	
	1	390	7	888	21	1597	320	-	45	9419	0	75	
	1	391	7	888	21	1597	356	-	26	9400	0	73	
	1	392	7	888	21	1598	227	-	52	9383	0	71	
	1	393	7	888	21	1600	253	-	23	8521	0	70	
	1	394	7	888	21	1600	258	-	18	8496	0	68	
	1	395	7	888	21	1602	232	-	12	8481	0	70	
	1	396	7	888	21	1602	196	-	46	8466	0	80	
	1	397	7	888	21	1603	236	-	36	8451	0	59	
	1	398	7	888	21	1603	253	-	28	8435	0	70	
	1	399	7	888	21	1605	256	-	46	8419	0	69	
	1	430	7	888	21	1638	234	-	34	6720	0	4	
	1	431	7	888	21	1638	199	-	24	6717	0	7	
	1	432	7	888	21	1640	188	-	38	6715	0	9	
	1	433	7	888	21	1650	185	-	25	6715	0	9	
	1	434	7	888	21	1642	171	-	11	6716	0	23	
	1	435	7	888	21	1642	113	-	13	6719	0	20	
	1	436	7	888	21	1643	35907	13	5884	0	16		
	1	437	7	888	21	1645	35722	18	5891	0	9		
	1	438	7	888	21	1645	35472	28	5899	0	6		
	1	439	7	888	21	1647	35176	-	6	5908	0	25	
	1	440	7	888	21	1647	35225	-	25	5913	0	15	
	1	441	7	888	21	1648	35034	-	14	5920	0	5	
	1	478	7	888	21	1697	0	0	0	2690	0	12	
	1	479	7	888	21	1697	63	-	33	2663	0	18	
	1	480	7	888	21	1698	35937	-	17	2629	0	37	
	1	481	7	888	21	1698	35832	-	57	2594	0	29	
	1	482	7	888	21	1700	0	-	25	2560	0	30	

Figure 16. ED AND INSERT listing (part 7).

SENSOR	6	17 868211				20000				SONAR 999C8				M D				50505050				GSDT	
		EDIT MARK	CODE	NUM	RAN	REP	DES	SEN	TIME	ACTUAL	BEAR	ADJUST	ACTUAL	RANGE	RANGE	RANGE	RANGE	PLOT	CODE				
1	400	7	868	21	1607	-	345	-	70	10482	0-	0-	5	712									
1	401	7	868	21	1608	-	384	-	44	10471	0-	0-	36	712									
1	402	7	868	21	1608	-	337	-	37	10460	0-	0-	13	712									
1	403	7	868	21	1610	-	35992	-	17	10441	0-	0-	36	712									
1	404	7	868	21	1610	-	35200	-	20	10410	0-	0-	5	712									
1	405	7	868	21	1612	-	34289	-	59	10379	0-	0-	20	712									
1	406	7	868	21	1613	-	33790	-	50	12868	0-	0-	32	712									
1	407	7	868	21	1613	-	36321	-	61	12845	0-	0-	5	712									
1	408	7	868	21	1615	-	35183	-	33	12823	0-	0-	41	712									
1	409	7	868	21	1617	-	35596	-	46	12802	0-	0-	20	712									
1	410	7	868	21	1617	-	35783	-	23	12784	0-	0-	39	712									
1	411	7	868	21	1618	-	35847	-	28	12771	0-	0-	26	712									
1	412	7	868	21	1620	-	35863	-	33	16969	0-	0-	56	712									
1	413	7	868	21	1620	-	35880	-	20	16966	0-	0-	53	712									
1	414	7	868	21	1622	-	35895	-	20	16965	0-	0-	35	712									
1	415	7	868	21	1622	-	35924	-	24	16964	0-	0-	34	712									
1	416	7	868	21	1622	-	35914	-	6	16964	0-	0-	34	712									
1	417	7	868	21	1623	-	35886	-	11	16968	0-	0-	38	712									
1	418	7	868	21	1625	-	35715	-	10	18659	0-	0-	56	712									
1	419	7	868	21	1627	-	35536	-	14	18665	0-	0-	15	712									
1	420	7	868	21	1627	-	35310	-	15	18671	0-	0-	49	712									
1	421	7	868	21	1627	-	35065	-	35	18676	0-	0-	54	712									
1	422	7	868	21	1627	-	34805	-	765	18675	0-	0-	53	712									
1	424	7	398	21	1632	-	618	-	43	8042	0-	0-	62	712									
1	425	7	868	21	1633	-	679	-	149	8029	0-	0-	74	712									
1	426	7	868	21	1633	-	520	-	70	8020	0-	0-	65	712									
1	427	7	868	21	1635	-	530	-	60	8012	0-	0-	57	712									
1	428	7	868	21	1635	-	411	-	51	8003	0-	0-	64	712									
1	429	7	868	21	1637	-	311	-	41	7995	0-	0-	65	712									
1	452	7	868	21	1662	-	35749	-	9	4705	0-	0-	65	712									
1	453	7	868	21	1663	-	35755	-	80	4669	0-	0-	69	712									
1	454	7	868	21	1663	-	35928	-	28	4630	0-	0-	30	712									
1	455	7	868	21	1665	-	35941	-	61	4592	0-	0-	70	712									
1	456	7	868	21	1665	-	35844	-	31	4542	0-	0-	20	712									
1	457	7	868	21	1667	-	35976	-	146	4502	0-	0-	102	712									

Figure 16. ED AND INSERT listing (part 8).

BEARING LIMITS	-36 TO	0 FOR MARKS	1 THRU	419	GFTCS 999C				T	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLUT CODE		
					EDIT	MARK	SEN	TIME								
SENSOR	7	CODE	NUM	RAN	REP	DES	BEAR	BEAR	BEAR	BEAR	BEAR	BEAR	BEAR	BEAR	BEAR	
2	1	7	888 41	897	35377	-	2	5268	5268	0	110	0	110	0	110	
3	3	7	888 41	900	35222	-	247	5012	5012	0	110	0	110	0	110	
2	4	7	888 41	903	35207	-	15	4795	4795	0	110	0	110	0	110	
2	5	7	888 41	905	35291	-	33	4701	4701	0	110	0	110	0	110	
3	6	7	888 41	905	35223	-	115	4654	4654	0	110	0	110	0	110	
2	7	7	888 41	907	35294	-	36	4557	4557	0	110	0	110	0	110	
2	9	7	888 41	908	35202	-	36	4461	4461	0	110	0	110	0	110	
2	10	7	888 41	910	35015	-	33	4393	4393	0	110	0	110	0	110	
2	11	7	888 41	910	35151	-	26	4322	4322	0	110	0	110	0	110	
2	12	7	888 41	912	35037	-	29	4275	4275	0	110	0	110	0	110	
2	13	7	888 41	913	34970	-	10	4113	4113	0	110	0	110	0	110	
2	14	7	888 41	913	35039	-	6	4042	4042	0	110	0	110	0	110	
2	15	7	888 41	915	35115	-	23	3946	3946	0	110	0	110	0	110	
2	16	7	888 41	917	34992	-	17	3874	3874	0	110	0	110	0	110	
2	17	7	888 41	918	34835	-	19	3780	3780	0	110	0	110	0	110	
2	18	7	888 41	918	34830	-	22	3710	3710	0	110	0	110	0	110	
2	19	7	888 41	920	34903	-	19	3663	3663	0	110	0	110	0	110	
2	20	7	888 41	920	34926	-	9	3592	3592	0	110	0	110	0	110	
3	21	7	888 41	922	34973	-	977	3563	3563	0	110	0	110	0	110	
2	22	7	888 41	922	34874	-	16	3497	3497	0	110	0	110	0	110	
2	402	7	888 41	1757	24943	-	9	3943	3943	0	110	0	110	0	110	
2	403	7	888 41	1758	24856	-	17	3966	3966	0	110	0	110	0	110	
2	404	7	888 41	1758	24766	-	16	3991	3991	0	110	0	110	0	110	
2	405	7	888 41	1758	24683	-	20	4017	4017	0	110	0	110	0	110	
2	408	7	888 41	1762	24289	-	23	4134	4134	0	110	0	110	0	110	
2	409	7	888 41	1762	24162	24169	-	16	4166	4166	0	110	0	110	0	110
2	410	7	888 41	1763	24076	-	16	4200	4200	0	110	0	110	0	110	
2	411	7	888 41	1763	23952	-	20	4233	4233	0	110	0	110	0	110	
2	412	7	888 41	1765	23873	-	25	4270	4270	0	110	0	110	0	110	
2	413	7	888 41	1765	23737	-	25	4306	4306	0	110	0	110	0	110	
2	414	7	888 41	1765	23689	-	28	4346	4346	0	110	0	110	0	110	
2	415	7	888 41	1767	23639	-	26	4383	4383	0	110	0	110	0	110	
2	416	7	888 41	1767	23594	-	20	4424	4424	0	110	0	110	0	110	
2	417	7	888 41	1768	23476	-	19	4483	4483	0	110	0	110	0	110	
2	418	7	888 41	1768	23342	-	22	4545	4545	0	110	0	110	0	110	
2	419	7	888 41	1770	23258	-	13	4589	4589	0	110	0	110	0	110	

Figure 16. ED AND INSERT listing (part 9).

RANGE LIMITS	-27 TO		0 FK MARKS		1 THRU		419		GFCS 999C		TP		RANGE		ERROR		RANGE		ERROR		PLOT		
	SEN	SUR	KAN	REP	DT	S	SEN	REP	DT	TIME	BEAR	ERR	AJUST	RANGE	ERR	AJUST	RANGE	ERR	AJUST	RANGE	ERR	CODE	
1	401	7	888 44	905	35291	0	4701	4701-	21	110													
1	402	7	888 44	905	35223	0	4654	4654-	16	110													
1	403	7	888 44	905	35254	0	4557	4557-	16	110													
1	404	7	888 44	905	35202	0	4461	4461-	18	110													
1	405	7	888 44	905	35075	0	4393	4393-	13	110													
1	408	7	888 44	910	35151	0	4322	4322-	13	110													
1	410	7	888 44	910	35037	0	4275	4275-	16	110													
1	412	7	888 44	912	34976	0	4113	4113-	14	110													
1	413	7	888 44	913	35039	0	4042	4042-	12	110													
1	414	7	888 44	915	35115	0	3946	3946-	6	110													
1	415	7	888 44	917	34932	0	3874	3874-	15	110													
1	416	7	888 44	918	34835	0	3760	3780-	16	110													
1	417	7	888 44	918	34830	0	3710	3710-	22	110													
1	418	7	888 44	920	34903	0	3663	3663-	21	110													
1	419	7	888 44	922	34646	0	3555	3555-	15	110													
1	23	7	888 44	925	34730	0	3283	3283-	18	110													
1	24	7	888 44	925	34730	0	3234	3234-	14	110													
1	25	7	888 44	927	34730	0	3073	3073-	13	110													
1	26	7	888 44	927	34920	0	3001	3001-	16	110													
1	27	7	888 44	928	34895	0	2930	2930-	9	110													
1	28	7	888 44	930	34595	0	2883	2883-	17	110													
1	29	7	888 44	930	34555	0																	
1	401	7	888 44	1757	25027	0	3920	3920-	17	110													
1	402	7	888 44	1757	24943	0	3943	3943-	17	110													
1	403	7	888 44	1757	24856	0	3966	3966-	12	110													
1	404	7	888 44	1758	24766	0	3991	3991-	11	110													
1	405	7	888 44	1758	24603	0	4017	4017-	15	110													
1	408	7	888 44	1762	24289	0	4134	4134-	14	110													
3	409	7	888 44	1762	24192	0	4166	4166-	29	110													
1	410	7	888 44	1763	24076	0	4200	4200-	18	110													
1	411	7	888 44	1763	23922	0	4233	4233-	13	110													
1	412	7	888 44	1765	23873	0	4270	4270-	12	110													
1	413	7	888 44	1765	23737	0	4306	4306-	18	110													
1	414	7	888 44	1765	23689	0	4346	4346-	20	110													
1	415	7	888 44	1767	23639	0	4383	4383-	20	110													
1	416	7	888 44	1767	23594	0	4424	4424-	24	110													
1	417	7	888 44	1768	23474	0	4483	4483-	19	110													
1	418	7	888 44	1768	23342	0	4545	4545-	20	110													
1	419	7	888 44	1770	23258	0	4589	4589-	13	110													

Figure 16. ED AND INSERT listing (part 10).

BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 2??  
 RANGE LIMITS -20 TO 120 FOR MARKS WITH PLOT CODE OF 2??  
 BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 3??  
 RANGE LIMITS -50 TO 120 FOR MARKS WITH PLOT CODE OF 3??  
 BEARING LIMITS -150 TO 100 FOR MARKS WITH PLOT CODE OF 4??  
 RANGE LIMITS -140 TO 140 FOR MARKS WITH PLOT CODE OF 4??  
 BEARING DATA DELETED FROM MARK 3C4  
 BEARING DATA DELETED FROM MARK 30c

SENSOR	9	17 863612							SS RADAR 999A 990							ADJUST RANGE	ACTUAL RANGE	RANGE ERROR
		EDIT	MARK	SEN	REP	DES	TIME	ACTUAL	BEAR	BEAR	SEN	REP	DES	TIME	BEAR			
	b	7	888 61	1205	35223	-	7	6061	6061	6061	59	212	34821	-	11	6048	6048	212
	9	7	888 61	1207	34707	-	11	6048	6048	6048	62	212	34561	-	11	6042	6042	212
	10	7	888 61	1207	34707	-	11	6042	6042	6042	83	212	34561	-	11	6036	6036	212
	11	7	888 61	1208	34561	-	5	6036	6036	6036	29	212	34561	-	5	6031	6031	212
	12	7	888 61	1208	34595	-	5	6031	6031	6031	64	212	34595	-	6	6026	6026	212
	13	7	888 61	1210	34266	-	6	6026	6026	6026	59	212	34174	-	4	6020	6020	212
	14	7	888 61	1210	34174	-	4	6020	6020	6020	85	212	34064	-	21	6014	6014	212
	15	7	888 61	1212	34064	-	27	6000	6000	6000	50	212	33797	-	30	5988	5988	212
	16	7	888 61	1213	33797	-	30	5988	5988	5988	57	212	33797	-	12	5979	5979	212
	17	7	888 61	1213	33797	-	30	5979	5979	5979	61	212	33692	-	3	5967	5967	212
	18	7	888 61	1215	33692	-	20	5960	5960	5960	0	212	33560	-	20	5960	5960	212
	19	7	888 61	1217	33560	-	30	5950	5950	5950	80	212	33490	-	30	5940	5940	212
	20	7	888 61	1217	33490	-	47	5940	5940	5940	55	212	33447	-	62	5930	5930	212
	21	7	888 61	1218	33447	-	21	5921	5921	5921	79	212	33400	-	50	5912	5912	212
	22	7	888 61	1220	33400	-	43	5902	5902	5902	18	212	33383	-	43	5889	5889	212
	23	7	888 61	1218	33412	-	5	5889	5889	5889	36	212	33265	-	33	11455-	11455-	212
	24	7	888 61	1220	33391	-	21	5921	5921	5921	79	212	33391	-	21	5912	5912	212
	25	7	888 61	1220	33400	-	50	5912	5912	5912	68	212	33400	-	50	5902	5902	212
	26	7	888 61	1222	33383	-	43	5902	5902	5902	18	212	33383	-	43	5889	5889	212
	27	7	888 61	1222	33265	-	5	5889	5889	5889	36	212	33265	-	33	11455-	11455-	212
	346	7	888 61	1800	24265	-	5	12556-	12556-	12556-	41	422	24205	-	5	12550	12550	422
	347	7	888 61	1802	24082	-	22	12624	12624	12624	95	422	24082	-	11	12658	12658-	422
	348	7	888 61	1802	24082	-	11	12658	12658	12658	33	422	1803	-	34	11658	11658-	422
	349	7	888 61	1803	24044	-	11	12689	12689	12689	86	422	1803	-	31	11693	11693	422
	350	7	888 61	1803	23901	-	11	11455-	11455-	11455-	125	422	23901	-	30	11488	11488	422
	351	7	888 61	1805	23830	-	33	11521	11521	11521	29	422	23830	-	33	11521	11521	422
	352	7	888 61	1807	23833	-	33	11521	11521	11521	29	422	23833	-	33	11521	11521	422
	353	7	888 61	1807	23833	-	15	11589	11589	11589	89	422	23695	-	15	11589	11589	422
	355	7	888 61	1808	23695	-	15	11658	11658	11658	63	422	1810	-	34	11658	11658-	422
	356	7	888 61	1810	23584	-	34	11693	11693	11693	27	422	1810	-	31	11693	11693	422
	357	7	888 61	1812	23521	-	31	11693	11693	11693	27	422	1812	-	31	11693	11693	422
	358	7	888 61	1812	23576	-	56	9544-	9544-	9544-	4	422	1812	-	56	9544-	9544-	422
	359	7	888 61	1813	23423	-	23	9596	9596	9596	76	422	1813	-	23	9596	9596	422
	360	7	888 61	1813	23503	-	73	9633	9633	9633	53	422	1813	-	73	9633	9633	422
	361	7	888 61	1817	23377	-	57	9717	9717	9717	62	422	1817	-	57	9717	9717	422
	362	7	888 61	1817	23356	-	56	9753	9753	9753	103	422	1817	-	56	9753	9753	422
1	363	7	888 61	1818	23319	-	181	9789	9789	9789	59	422	1818	-	181	9789	9789	422

Figure 16. ED AND INSERT listing (part 11).

SENSOR	10	17 66611										SS RADAR 999A 99D									
		EDIT MARK	CODE	NUM	RAN	REP	SEN	DES	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	RANGE	PLOT	CODE			
		8	7	888 61	1205	35223	-	-	7	6061	6061	59	212								
		9	7	888 61	1207	34821	-	-	11	6068	6068	62	212								
		10	7	888 61	1207	34707	-	-	17	6042	6042	83	212								
		11	7	888 61	1208	34594	-	-	11	6036	6036	29	212								
		12	7	888 61	1208	34395	-	-	5	6031	6031	64	212								
		13	7	888 61	1210	34266	-	-	6	6026	6026	59	212								
		14	7	888 61	1210	34174	-	-	4	6020	6020	85	212								
		15	7	888 61	1212	34041	-	-	21	6014	6014	46	212								
		16	7	888 61	1213	33797	-	-	27	6000	6000	50	212								
		17	7	888 61	1213	33720	-	-	30	5988	5988	57	212								
		18	7	888 61	1215	33692	-	-	12	5979	5979	61	212								
		19	7	888 61	1215	33647	-	-	3	5969	5969	76	212								
		20	7	888 61	1217	33580	-	-	20	5960	5960	0	212								
		21	7	888 61	1217	33490	-	-	30	5950	5950	80	212								
		22	7	888 61	1218	33447	-	-	47	5960	5960	55	212								
		23	7	888 61	1218	33412	-	-	62	5930	5930	65	212								
		24	7	888 61	1220	33391	-	-	21	5921	5921	79	212								
		25	7	888 61	1220	33340	-	-	50	5912	5912	68	212								
		26	7	888 61	1222	33333	-	-	43	5902	5902	18	212								
		27	7	888 61	1222	33285	-	-	5	5889	5889	36	212								
		28	7	888 61	1223	33137	-	-	37	5874	5874	51	212								
		299	7	888 61	1792	11543	-	-	63	2069	2069	1	212								
		300	7	888 61	1793	11659	-	-	19	2093	2093	22	212								
		301	7	888 61	1795	11630	-	-	10	2117	2117	3	212								
		302	7	888 61	1795	11821	-	-	51	2141	2141	79	212								
		303	7	888 61	1795	11915	-	-	15	2166	2166	34	212								
1		304	7	888 61	1797	11710	-	-	80	2202	2202	28	212								
1		305	7	888 61	1798	11502	-	-	2	2237	2237	38	212								
1		306	7	888 61	1798	11261	-	-	49	2260	2260	45	212								
		307	7	888 61	1798	11264	-	-	34	2281	2281	74	212								
		308	7	888 61	1798	11384	-	-	24	2302	2302	48	212								
		309	7	888 61	1798	11618	-	-	28	2333	2333	22	212								
		311	7	888 61	1798	12593	-	-	33	2384	2384	11	212								
		312	7	888 61	1798	13426	-	-	50	2450	2450	30	212								
		314	7	888 61	1798	13531	-	-	41	2523	2523	17	212								
		315	7	888 61	1798	13623	-	-	23	2559	2559	41	212								
		316	7	888 61	1798	13346	-	-	6	2595	2595	80	212								
		317	7	888 61	1798	12935	-	-	15	2629	2629	36	212								
		318	7	888 61	1798	12963	-	-	13	2660	2660	40	212								
		319	7	888 61	1798	13191	-	-	41	2691	2691	29	212								

Figure 16. ED AND INSERT listing (part 12).

SUR 11

17 805011 103009

EDIT MARK CODE	MARK NUM	RAN	REP DES	SEN	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
97	7	868 61	1382	6915	-	5	4694	4694	76	312	
98	7	885 61	1383	7073	-	53	4693	4693	87	312	
99	7	883 61	1383	7242	-	42	4694	4694	56	312	
100	7	883 61	1385	7639	-	59	4698	4698	82	312	
101	7	883 61	1387	7859	-	4703	4703	67	312		
102	7	888 61	1387	8077	-	47	4708	4708	62	312	
103	7	888 61	1388	8293	-	63	4715	4715	55	312	
104	7	888 61	1390	8660	-	70	4733	4733	97	312	
105	7	889 61	1390	8892	-	52	4745	4745	30	312	
106	7	888 61	1392	9120	-	50	4757	4757	63	312	
107	7	888 61	1392	9367	-	67	4773	4773	37	312	
108	7	888 61	1393	9601	-	61	4791	4791	34	312	
110	7	883 61	1395	10031	-	101	4829	4829	41	312	
111	7	868 61	1395	10236	-	126	4851	4851	29	312	
112	7	863 61	1397	10481	-	111	4875	4875	25	312	
113	7	886 61	1397	10638	-	48	4901	4901	29	312	
114	7	888 61	1398	11917	-	57	5601	5601	69	312	
115	7	888 61	1415	12077	-	57	5634	5634	56	312	
116	7	888 61	1417	12011	-	41	5668	5668	22	312	
117	7	863 61	1417	12065	-	15	5702	5702	53	312	
263	7	868 61	1670	3135	-	45	2508	2508	2	312	
264	7	888 61	1670	3413	-	30	2462	2462	43	312	
265	7	888 61	1672	3430	-	10	2435	2435	0	312	
266	7	888 61	1672	3369	-	19	2407	2407	68	312	
267	7	888 61	1673	3512	-	42	2381	2381	89	312	
268	7	883 61	1675	3931	-	41	2344	2344	1	312	
269	7	888 61	1675	4299	-	29	2322	2322	22	312	
270	7	888 61	1677	4528	-	28	2302	2302	2	312	
271	7	888 61	1677	4452	-	2	2283	2283	32	312	
272	7	868 61	1677	4509	-	9	2264	2264	6	312	
273	7	888 61	1678	4636	-	46	2245	2245	45	312	
274	7	888 61	1678	4632	-	62	2226	2226	49	312	
275	7	883 61	1680	4827	-	47	2207	2207	12	312	
276	7	888 61	1680	5074	-	24	2187	2187	23	312	
277	7	888 61	1682	5389	-	41	2168	2168	22	312	
278	7	888 61	1682	5839	-	11	2146	2146	34	312	
279	7	888 61	1683	6010	-	10	2118	2118	27	312	
280	7	886 61	1685	5812	-	18	2101	2101	49	312	
281	7	888 61	1685	5936	-	24	2085	2085	40	312	

Figure 16. ED AND INSERT listing (part 13).

SENSUR	12	17 66611	20000	SS KADAR 969A 990					PLOT CODE				
		EDIT MARK	MARK	SEN	REP	DES	TIME	ACTUAL BEAR	BEAR ERROR	ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	
		CODE	NUM	RAN	SEN	REP	DES						
		133	7	888	61	1433	6461	-	11	6331	6331	89	422
		320	7	888	61	1772	26716	-	16	19452	19452	48	422
		321	7	888	61	1773	26564	-	6	19459	19459	31	422
		322	7	888	61	1773	26380	-	10	19466	19466	14	422
		323	7	888	61	1775	26272	-	72	19489	19489	11	422
		324	7	888	61	1777	26371	-	31	19500-	19500-	30	422
		325	7	888	61	1778	26353	-	17	19513	19513	47	422
		326	7	888	61	1780	26124	-	16	19533	19533	97	422
		327	7	888	61	1780	26062	-	12	17546	17546	29	422
		328	7	888	61	1782	26077	-	27	17558	17558	42	422
		329	7	888	61	1782	26043	-	7	17569	17569	76	422
		330	7	888	61	1783	25895	-	55	17583	17583	42	422
		331	7	888	61	1783	25785	-	25	17596	17596	104	422
		332	7	888	61	1785	25792	-	22	17621	17621	134	422
		333	7	888	61	1787	25461	-	11	15350	15350	20	422
		334	7	888	61	1788	25540	-	50	15367	15367	43	422
2		335	7	888	61	1788	25604	-	54	15385	15385	215	422
		336	7	888	61	1790	25393	-	7	15604	15604	66	422
		337	7	888	61	1792	25362	-	12	15924	15924	11	422
		338	7	888	61	1792	25212	-	12	15447	15447	93	422
		339	7	888	61	1793	24963	-	17	13413-	13413-	63	422
		340	7	888	61	1795	24849	-	1	13442	13442	123	422
		341	7	888	61	1797	24694	-	6	13490-	13490-	25	422
		342	7	888	61	1797	24640	-	10	13519-	13519-	14	422
		343	7	888	61	1798	24544	-	26	13520	13520	25	422
		344	7	888	61	1798	24504	-	4	13580	13580	100	422
		345	7	888	61	1800	24372	-	12	12525	12525	10	422
		346	7	888	61	1800	24265	-	5	12556-	12556-	41	422
		347	7	888	61	1802	24205	-	5	12590	12590	95	422
		348	7	888	61	1802	24082	-	22	12624	12624	41	422
		349	7	888	61	1803	24041	-	11	12658-	12658-	33	422
		350	7	888	61	1803	23901	-	11	12689	12689	86	422
		351	7	888	61	1805	23830	-	30	11455-	11455-	125	422
		352	7	888	61	1807	23833	-	33	11488	11488	87	422
		353	7	888	61	1807	23853	-	33	11521	11521	29	422
		355	7	888	61	1808	23695	-	15	11589-	11589-	99	422
		356	7	888	61	1810	23584	-	34	11658-	11658-	63	422
		357	7	888	61	1812	23521	-	31	11693	11693	27	422
		358	7	888	61	1812	23506	-	56	9544-	9544-	4	422
		359	7	888	61	1813	23423	-	23	9598-	9598-	76	422
		360	7	888	61	1813	23503	-	73	9633-	9633-	53	422
		361	7	888	61	1817	23377	-	57	9717-	9717-	62	422
		362	7	888	61	1817	23356	-	56	9753-	9753-	103	422
1		363	7	888	61	1818	23319	-	181	9789-	9789-	59	422

Figure 16. ED AND INSERT listing (part 14).

MARK	13 ANNIHILATED
MARK	22 ANNIHILATED
PARTIAL BEARING LIMITS	REPLACEMENT FROM MARK -20 TO 5
PARTIAL BEARING LIMITS	REPLACEMENT FROM MARK 17 THRU 5 FCK MARKS
	17 OF 17 OF 17 OF 17 OF
	- 10 - 10 - 10 - 10
	1 THRU 1 THRU 1 THRU 1 THRU

SENSOR	13	PER 999A ABC - 4										PLOT CODE
		0	- 6	0	-	ACTUAL BEAR	ADJUST BEAR	BEAR	ADJUST	RANGE	RANGE	
		SEN	REP	DES	TIME	BEAR	TIME	BEAR	BEAR	ERR		
EDIT	MARK	RAN	RAN	REP	DES	TIME	BEAR	TIME	BEAR	BEAR	ERR	
CODE	NUM											
17	86732	3	7	868	73	902	30731	-	114	0	0	102
		2	5	888	73	903	30744	-	6	0	0	102
		3	7	888	73	905	31059	-	7	0	0	102
		2	8	888	73	905	31296	-	16	0	0	102
		2	9	888	73	907	31520	-	9	0	0	102
		3	10	888	73	907	31802	-	87	0	0	102
		2	11	888	73	907	31942	-	15	0	0	102
		3	12	888	73	908	32204	-	94	0	0	102
		3	14	888	73	908	32349	-	82	0	0	102
		2	15	888	73	910	32591	-	10	0	0	102
		2	17	888	73	910	32749	-	10	0	0	102
		2	18	888	73	912	32998	-	11	0	0	102
		3	19	888	73	912	33118	-	12	0	0	102
		3	20	868	73	912	33318	-	13	0	0	102
		3	21	888	73	913	33563	-	108	0	0	102
		2	23	868	73	913	33884	-	9	0	0	102
		2	24	888	73	915	34006	-	7	0	0	102
		3	26	888	73	915	34433	-	14	0	0	102
		2	27	868	73	917	34648	-	9	0	0	102
		2	28	888	73	917	34871	-	16	0	0	102
		2	217	7	868	73	1048	29797	-	7	0	102
		2	218	7	888	73	1048	29964	-	6	0	102
		2	219	7	888	73	1048	30168	-	12	0	102
		2	220	7	888	73	1050	30318	-	10	0	102
		2	223	7	888	73	1058	31878	-	7	0	102
		2	435	7	888	73	1225	4984	-	11	0	102
		2	436	7	888	73	1225	5191	-	8	0	102
		2	437	7	888	73	1227	5382	-	6	0	102
		3	438	7	368	73	1227	5569	-	5011	0	102
		2	439	7	888	73	1227	5727	-	15	0	102
		2	440	7	888	73	1228	5872	-	13	0	102
		2	441	7	888	73	1228	6018	-	12	0	102
		2	442	7	888	73	1228	6148	-	13	0	102
		2	443	7	868	73	1230	6281	-	12	0	102
		2	444	7	888	73	1230	6407	-	13	0	102
		2	445	7	868	73	1230	6512	-	12	0	102
		2	446	7	868	73	1232	6608	-	12	0	102
		2	447	7	868	73	1232	6703	-	12	0	102
		2	448	7	868	73	1232	6796	-	10	0	102

Figure 16. ED AND INSERT listing (part 15).

BEARING LIMITS -15 TO 10 FOR MARKS  
MARK 227 DELETED FROM COMPUTATIONS

SENSOR	14	17 888742				PER 999A ABC				ADJUST RANGE	ACTUAL RANGE	RANGE ERROR	PLOT CODE
		EDIT MARK CODE	MARK NUM	RAN	REP DES	SEN	TIME	ACTUAL BEAR	BEAR ERROR				
2	224	7	888 74	1060		31807	1	0	0	0	0	0	202
2	225	7	888 74	1060		31620	0	0	0	0	0	0	202
3	226	7	988 74	1060		31375	11	0	0	0	0	0	202
3	227	7	888 74	1062		31036	10	0	0	0	0	0	202
3	228	7	888 74	1062		30755	14	0	0	0	0	0	202
2	229	7	888 74	1062		30469	2	0	0	0	0	0	202
2	230	7	888 74	1063		30264	3	0	0	0	0	0	202
2	231	7	888 74	1063		30110	3	0	0	0	0	0	202
2	232	7	888 74	1063		29893	7	0	0	0	0	0	202
2	233	7	888 74	1065		29701	2	0	0	0	0	0	202
2	234	7	888 74	1065		29575	-	3	0	0	0	0	202
2	235	7	888 74	1065		29450	4	0	0	0	0	0	202
2	236	7	888 74	1067		29297	2	0	0	0	0	0	202
2	237	7	888 74	1067		29140	2	0	0	0	0	0	202
4	238	7	888 74	1067		28946	2	0	0	0	0	0	202
2	239	7	888 74	1068		28863	6	0	0	0	0	0	202
2	240	7	888 74	1068		28748	2	0	0	0	0	0	202
2	242	7	888 74	1068		28497	-	1	0	0	0	0	202
2	243	7	888 74	1070		28472	4	0	0	0	0	0	202
2	244	7	888 74	1070		282d7	3	0	0	0	0	0	202
2	422	7	888 74	1200		34285	-	2	0	0	0	0	202
2	423	7	888 74	1200		33983	-	3	0	0	0	0	202
2	425	7	888 74	1202		33236	-	3	0	0	0	0	202
3	426	7	888 74	1202		32876	18	0	0	0	0	0	202
2	427	7	888 74	1203		32656	-	1	0	0	0	0	202
2	428	7	888 74	1203		32497	0	0	0	0	0	0	202
2	429	7	888 74	1203		32366	0	0	0	0	0	0	202
2	430	7	888 74	1205		32313	0	0	0	0	0	0	202
3	431	7	888 74	1205		32400	-	1G2	0	0	0	0	202
2	432	7	888 74	1205		32273	-	1	0	0	0	0	202
2	433	7	888 74	1207		32222	-	1	0	0	0	0	202
2	450	7	888 74	1233		6794	-	2	0	0	0	0	202
2	451	7	888 74	1235		6701	-	5	0	0	0	0	202
2	452	7	888 74	1235		6586	-	6	0	0	0	0	202
2	453	7	888 74	1235		6455	-	4	0	0	0	0	202
2	454	7	888 74	1237		6337	-	5	0	0	0	0	202
2	457	7	888 74	1238		5944	0	0	0	0	0	0	202
2	458	7	888 74	1238		5815	-	6	0	0	0	0	202
2	459	7	888 74	1238		5608	-	6	0	0	0	0	202
2	460	7	888 74	1240		5486	0	0	0	0	0	0	202

Figure 16. ED AND INSERT listing (part 16).

PARTIAL REPLACEMENT FROM MARK 277 THRU 277 OF 6435  
 BEARING LIMITS -100 TO 0 FOR MARKS WITH PLU CODE UF 122  
 BEARING LIMITS -100 TO 20 FOR MARKS WITH PLU CODE UF 222  
 MARK 15 DELETED FROM COMPUTATIONS  
 MARK 371 DELETED FROM COMPUTATIONS

17 868812		EDIT	MARK	PEL	ALID	999	99	PLOT	CODE							
SENSOR	15	CODE	NUM	RAN	SEN	REP	DES	TIME	ACTUAL	BEAR	BEAR	ADJUST	ACTUAL	RANGE	RANGE	ERROR
		2	13	7	888	81		1125	34101	-	51	0	0	0	0	102
		2	14	7	888	81		1157	33886	-	41	0	0	0	0	102
		3	15	7	888	81		1157	336.6	-	11	0	0	0	0	102
		3	16	7	888	81		1158	334628	-	120	0	0	0	0	102
		2	17	7	888	81		1158	33311	-	33	0	0	0	0	102
		2	18	7	888	81		1160	334603	-	46	0	0	0	0	102
		2	19	7	888	81		1160	33347	-	45	0	0	0	0	102
		2	21	7	888	81		1162	32837	-	79	0	0	0	0	102
		2	22	7	888	81		1163	32791	-	39	0	0	0	0	102
		2	23	7	888	81		1163	32544	-	33	0	0	0	0	102
		3	24	7	888	81		1163	3222.8	-	150	0	0	0	0	102
		3	25	7	888	81		1165	32014	-	82	0	0	0	0	102
		2	26	7	888	81		1167	31764	-	63	0	0	0	0	102
		2	27	7	888	81		1167	31633	-	81	0	0	0	0	102
		2	28	7	888	81		1168	31434	-	58	0	0	0	0	102
		2	30	7	888	81		1178	29903	-	65	0	0	0	0	102
		3	31	7	888	81		1178	30057	8	0	0	0	0	0	102
		2	32	7	888	81		1180	30014	-	72	0	0	0	0	102
		2	33	7	888	81		1180	29913	-	70	0	0	0	0	102
		2	34	7	888	81		1182	29821	-	51	0	0	0	0	102
		2	336	7	888	81		1575	24991	-	60	0	0	0	0	102
		2	337	7	888	81		1575	24835	-	60	0	0	0	0	102
		2	338	7	888	81		1575	24681	-	41	0	0	0	0	102
		2	339	7	888	81		1577	24540	-	64	0	0	0	0	102
		2	340	7	888	81		1577	24275	-	45	0	0	0	0	102
		2	341	7	888	81		1578	23782	-	37	0	0	0	0	102
		2	342	7	888	81		1580	23383	-	54	0	0	0	0	102
		2	343	7	888	81		1580	23090	-	60	0	0	0	0	102
		2	344	7	888	81		1582	22788	-	63	0	0	0	0	102
		2	345	7	888	81		1582	22480	-	80	0	0	0	0	102
		2	347	7	888	81		1583	22119	-	43	0	0	0	0	102
		2	348	7	888	81		1585	21993	-	64	0	0	0	0	102
		2	351	7	888	81		1587	21225	-	66	0	0	0	0	102
		2	352	7	888	81		1587	20857	-	64	0	0	0	0	102
		2	353	7	888	81		1588	20524	-	54	0	0	0	0	102
		2	354	7	888	81		1588	20119	-	67	0	0	0	0	102
		2	355	7	888	81		1590	19670	-	76	0	0	0	0	102
		3	356	7	968	81		1590	19477	-	239	0	0	0	0	102
		2	357	7	888	81		1592	18882	-	0	0	0	0	0	102

Figure 16. ED AND INSERT listing (part 17).

SEE PRECEDING DATA FOR EDITING

SENSOR	16	17 688822										PEL ALIO 999 99									
		EDIT	MARK	SEN	ACTUAL	BEAR	ADJUST	ACTUAL	RANGE	PLOT	CODE	CODE	CODE	CODE	CODE	CODE	CODE	CODE	CODE	CODE	CODE
		CODE		SEN	REP	DES	TIME	BEAR	BEAR	RANGE											
				RAN																	
2	143	7	888	82	1360	-	748	-	31	0	0	0	0	0	0	0	0	0	0	0	0
2	144	7	888	82	1360	-	693	-	27	0	0	0	0	0	0	0	0	0	0	0	0
2	145	7	888	82	1362	-	683	-	32	0	0	0	0	0	0	0	0	0	0	0	0
2	146	7	888	82	1362	-	911	-	41	0	0	0	0	0	0	0	0	0	0	0	0
2	147	7	888	82	1363	-	1037	-	41	0	0	0	0	0	0	0	0	0	0	0	0
2	148	7	888	82	1363	-	1182	-	61	0	0	0	0	0	0	0	0	0	0	0	0
2	149	7	888	82	1363	-	1454	-	43	0	0	0	0	0	0	0	0	0	0	0	0
2	150	7	888	82	1365	-	1826	-	34	0	0	0	0	0	0	0	0	0	0	0	0
2	151	7	888	82	1365	-	2204	-	33	0	0	0	0	0	0	0	0	0	0	0	0
2	152	7	888	82	1367	-	2542	-	40	0	0	0	0	0	0	0	0	0	0	0	0
2	153	7	888	82	1367	-	2913	-	48	0	0	0	0	0	0	0	0	0	0	0	0
2	154	7	888	82	1367	-	3333	-	53	0	0	0	0	0	0	0	0	0	0	0	0
2	155	7	888	82	1368	-	3689	-	26	0	0	0	0	0	0	0	0	0	0	0	0
2	156	7	888	82	1368	-	3897	-	39	0	0	0	0	0	0	0	0	0	0	0	0
2	157	7	888	82	1370	-	4044	-	37	0	0	0	0	0	0	0	0	0	0	0	0
2	158	7	888	82	1370	-	4235	-	11	0	0	0	0	0	0	0	0	0	0	0	0
2	159	7	888	82	1372	-	4302	-	22	0	0	0	0	0	0	0	0	0	0	0	0
2	160	7	888	82	1372	-	4375	-	4	0	0	0	0	0	0	0	0	0	0	0	0
2	161	7	888	82	1372	-	4439	-	39	0	0	0	0	0	0	0	0	0	0	0	0
2	162	7	888	82	1373	-	4467	-	21	0	0	0	0	0	0	0	0	0	0	0	0
2	163	7	888	82	1373	-	4577	-	37	0	0	0	0	0	0	0	0	0	0	0	0
2	274	7	888	82	1497	-	8213	-	26	0	0	0	0	0	0	0	0	0	0	0	0
2	275	7	888	82	1497	-	8289	-	14	0	0	0	0	0	0	0	0	0	0	0	0
2	276	7	888	82	1497	-	8290	-	22	0	0	0	0	0	0	0	0	0	0	0	0
3	277	7	888	82	1498	-	8435	-	8945	0	0	0	0	0	0	0	0	0	0	0	0
2	279	7	888	82	1500	-	8849	-	10	0	0	0	0	0	0	0	0	0	0	0	0
2	280	7	888	82	1500	-	9078	-	29	0	0	0	0	0	0	0	0	0	0	0	0
2	281	7	888	82	1502	-	9350	-	24	0	0	0	0	0	0	0	0	0	0	0	0
2	282	7	888	82	1502	-	9629	-	39	0	0	0	0	0	0	0	0	0	0	0	0
2	283	7	888	82	1503	-	9852	-	67	0	0	0	0	0	0	0	0	0	0	0	0
2	2d4	7	888	82	1503	-	9982	-	47	0	0	0	0	0	0	0	0	0	0	0	0
2	286	7	888	82	1505	-	10576	-	36	0	0	0	0	0	0	0	0	0	0	0	0
2	287	7	888	82	1507	-	15156	-	38	0	0	0	0	0	0	0	0	0	0	0	0
2	288	7	888	82	1508	-	15998	-	39	0	0	0	0	0	0	0	0	0	0	0	0
2	289	7	888	82	1508	-	14904	-	63	0	0	0	0	0	0	0	0	0	0	0	0
2	290	7	888	82	1509	-	14950	-	35	0	0	0	0	0	0	0	0	0	0	0	0
2	291	7	888	82	1600	-	15619	-	35	0	0	0	0	0	0	0	0	0	0	0	0
3	292	7	888	82	1602	-	16276	-	10041	0	0	0	0	0	0	0	0	0	0	0	0
3	293	7	888	82	1603	-	16955	-	77	0	0	0	0	0	0	0	0	0	0	0	0

Figure 16. ED AND INSERT listing (part 18).

## DATA BANK PROGRAMS

### COMPUTE SENSOR ERROR PROGRAM

This program uses the output tape of ED AND INSERT. It sectors data automatically from the sensor descriptor and plot codes on the "ED AND INSERT" tape. Data are sectorized by time, bearing, or range. The time sector is 0.20 hour, the bearing is 10 degrees, and range is 1 000 yards (except for sonar-range scales less than 10 000 yards when it is 10 percent of scale). For each sector, the program prints out the number of data points, their average value, standard deviation, and confidence factor. It retains on the tape the number of data points, the sum of X, and the sum of  $X^2$ . Figure 17 shows the report critique function using the output of this program. Figure 18 shows the output of the COMPUTE SENSOR ERROR program. All those statistical values which are used in the written report to analyze sensor performance are checked against those computed by this program (tables 13 through 18). If any deficiencies are found, the reasons for such deficiencies are determined. If the range has made an error, this information is forwarded to range personnel. If mistakes were made in the editing of the data, corrections are made and the data reprocessed.

Figure 19 illustrates the types of printouts produced by this program. For each sensor the first page is a list of interval statistics followed by statistical computations appropriate to the sensor.

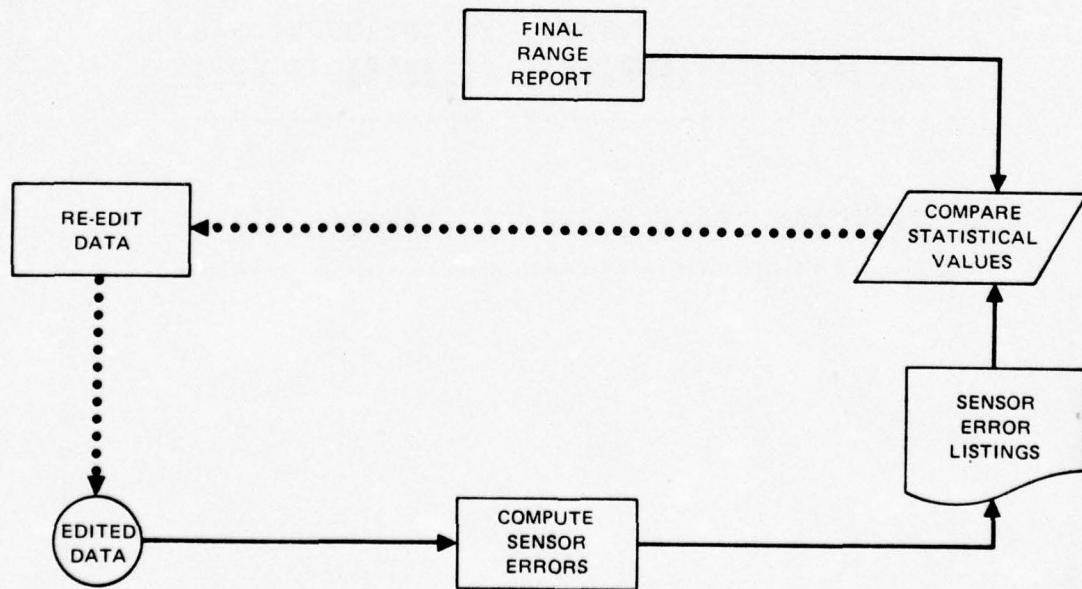


Figure 17. Critique function using COMPUTE SENSOR ERROR output.

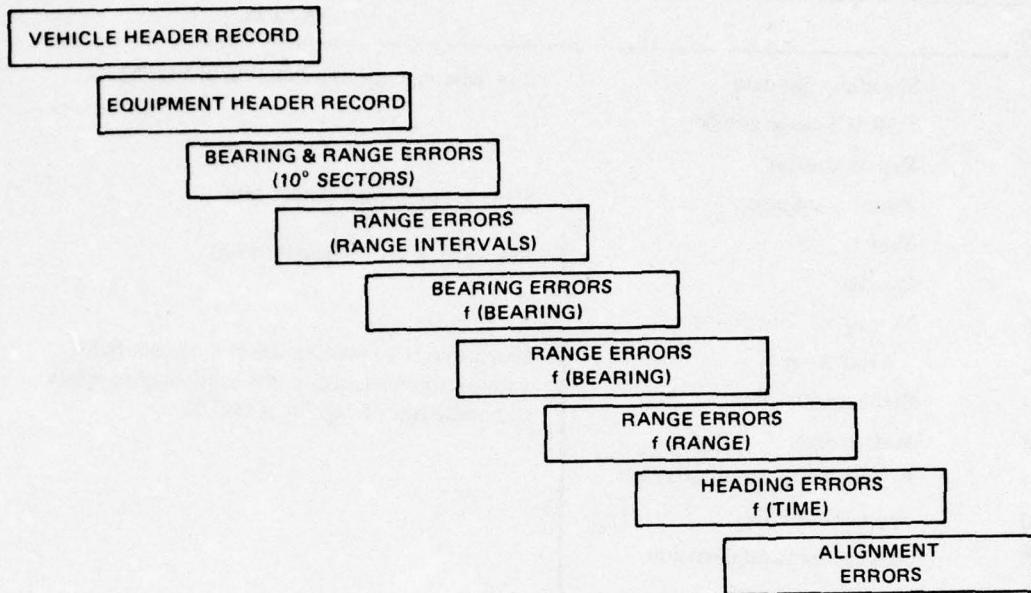


Figure 18. COMPUTE SENSOR ERROR outputs.

TABLE 13. DATA BANK RECORD, GYRO ERRORS

Column	Data	Remarks
1	Specifies type data	7 = gyro error
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	
10	Quarter	
18-22	Settled error	Gyro error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Average standard deviation	
32-36	Max mean error	
39-43	Excursion from settled error	
46-50	Peak-to-Valley variation (PVV)	
53-57	Midpoint of PVV	

TABLE 14. DATA BANK RECORD, BEARING ERRORS.

Column	Data	Remarks
1	Specifies type data	2 = bearing error as a function of bearing
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	
10	Quarter	}
12-15	Number of data points	
18-22	Average error	
25-29	Standard deviation	
32-36	Median error	
39-43	Peak-to-Valley variation (PVV)	
46-50	Midpoint of PVV	
53-57	Average standard deviation	
60-64	Maximum error	

TABLE 15. DATA BANK RECORD, RANGE ERRORS.

Column	Data	Remarks
1	Specifies type data	3 = range error as a function of bearing 4 = range error as a function of range
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	Same as equipment header card
9	Year	
10	Quarter	}
12-15	Number of data points	
16-22	Average error	
23-29	Standard deviation	
30-36	Median error	
37-43	Peak-to-Valley variation (PVV)	
44-50	Midpoint of PVV	
51-57	Average standard deviation	
58-64	Maximum error	

TABLE 16. DATA BANK RECORD OF PERISCOPE ALIGNMENT ERROR  
AND LOST MOTION FROM CALIBRATION TEST DATA.

Column	Data	Remarks
1	Specifies alignment check	A = Alignment check
2	FORACS range number	
3-6	Report number	
7-8	Field descriptor	
9	Year	
10	Quarter	
18-22	Alignment error	Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Lost motion	

TABLE 17. DATA BANK RECORD OF PERISCOPE BENCHMARK ALIGNMENT.

Column	Data	Remarks
1	Specifies benchmark checks	"B" = BM check
2	FORACS range number	
3-6	Report number	
7-8	Field descriptor	
9	Year	
10	Quarter	
18-22	Alignment error (Lo power)	Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
25-29	Lost motion (Lo power)	
32-36	Alignment error (Hi power)	
39-43	Lost motion (Hi power)	

TABLE 18. DATA BANK RECORD OF GUN FIRE-CONTROL  
BENCHMARK CHECKS.

Column	Data	Remarks
1	Specifies benchmark checks	"B" = BM check
2	FORACS range number	
3-6	Report number	
7-8	Sensor descriptor	
9	Year	
10	Quarter	
32-36	Alignment error	Bearing error parameters are five column fields with overpunched sign in the first column, values to hundredths of degrees, ie 000.00
39-43	Lost Motion error	

## LISTING OF GYRO INTERVAL MEANS

GYRO 99A 99A

JOAN CATHERINE SS 9999

FORACS 7 REPORT NO 688, FIELD 11

START TIME	FINISH TIME	NO OF POINTS	AVERAGE	ST. DEV
1000	1020	4	-0.15	0.01
1020	1040	13	-0.14	0.04
1040	1060	13	-0.15	0.02
1060	1080	15	-0.16	0.05
1080	1100	3	-0.21	0.01
1100	1120	5	-0.23	0.04
1120	1140	15	-0.16	0.03
1140	1160	16	-0.07	0.04
1160	1180	11	-0.07	0.04
1180	1200			
1200	1220			
1220	1240			
1240	1260	13	-0.04	0.05
1260	1280	21	-0.09	0.06
1280	1300	10	-0.13	0.04
1300	1320	10	-0.13	0.04
1320	1340	19	-0.19	0.07
1340	1360	18	-0.25	0.06
1360	1380	18	-0.33	0.06
1380	1400	1	-0.32	0.00
1400	1420			
1420	1440	3	-0.05	0.10
1440	1460	14	-0.01	0.07
1460	1480	11	0.09	0.07
1480	1500			
1500	1520	12	0.01	0.06
1520	1540	19	-0.05	0.08
1540	1560	13	-0.06	0.06
1560	1580	16	-0.11	0.06
1580	1600			
1600	1620	19	-0.12	0.05
1620	1640	8	-0.12	0.06
1640	1660	6	-0.15	0.04
1660	1680	16	-0.17	0.05
1680	1700	6	-0.16	0.03
1700	1720			

Figure 19. COMPUTE SENSOR ERROR program output (part 1).

## LISTING OF GYRO STATISTICS

GYRO 999	99A	JUAN CATHERINE	SS	9999	DATE: 12/25/76	FORAC 7 REPORT NO 888, FIELD 11
			17 880112		GYRO 999 99A - 16	
SETTLED ERROR (SE)	-0.16	DEGREES				
PEAK-TO-VALLEY VARIATION (PVV)	0.42	DEGREES				
MAXIMUM EXCURSION FROM SE (MESE)	0.25	DEGREES				
MIDPOINT OF PVV (MP)	-0.12	DEGREES				
P	0.09	DEGREES				
E	-0.33	DEGREES				
PEAK VALLEY						
MAXIMUM MEAN ERROR (MME)	-0.33	DEGREES				
AVERAGE STANDARD DEVIATION (ASD)	0.05	DEGREES				

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976  
THIS IS SENSOR NUMBER 1

Figure 19. COMPUTE SENSOR ERROR program output (part 2).

## ERRORS AS A FUNCTION OF BEARING

SONAR 999CB JUAN CATHERINE SS 9999 SONAR 999CB DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 21

17 888212 100000

BEARING	NUMB	RANGE ERRORS			BEARING ERRORS			ERRORS		
		Avg	SD	CONF	NUMB	Avg	SD	CONF	SD	CONF
165 TO 195					6.6	4.9				
195 TO 205					14.2	9.3				
205 TO 215	7	-20.4			5.9	4.3	11	-0.43	0.73	0.43
215 TO 225	4	-9.1			10	4.3	9	-0.93	0.19	0.12
225 TO 235	10	5.9			5.5	3.4	10	-0.65	0.26	0.17
235 TO 245	10	11.3			5.3	3.5	10	-0.31	0.14	0.09
245 TO 255	9	21.8			5.3	3.5	9	-0.40	0.25	0.16
255 TO 265	10	33.1			9.1	5.7	10	0.11	0.22	0.14
265 TO 275	11	42.7			11.3	6.7	11	-0.34	0.37	0.22
275 TO 285	11	49.9			13.0	6.4	15	-0.12	0.30	0.15
285 TO 295	16	58.0			10.3	5.4	13	-0.46	0.18	0.10
295 TO 305	14	55.8			9.7	5.3	12	-0.43	0.20	0.11
305 TO 315	13	31.5			28.0	10.6	7	-0.55	0.24	0.17
315 TO 325	7	32.5			31.4	8.1	5.0	1.0	-0.27	0.08
325 TO 335	10	33.5			37.4	7.3	3.3	2.0	-0.76	0.30
335 TO 345	19	51.2			13.7	12.0	1	-0.85	0.00	0.00
345 TO 355	5	47.8			14.2	13.9	4	-0.74	0.36	0.36
355 TO 365	4	39.8			19.4	7.2	29	-0.75	0.40	0.14
5 TO 15	26	24.7			5.4	4.0	7	-1.01	0.47	0.34
15 TO 25	7	18.9			7.4	4.8	9	-0.59	0.21	0.14
25 TO 35	9	8.8			14.2	12.5	5	-0.45	0.19	0.16
35 TO 45	5	-3.2			12.6	10.1	6	-0.72	0.32	0.26
45 TO 55	6	4.1			9.9	6.9	8	-0.48	0.33	0.23
55 TO 65	8	6.6			9.7	6.4	8	-0.75	0.12	0.08
65 TO 75	9	5.2			3.3	2.6	6	-0.78	0.18	0.14
75 TO 85	6	5.5			11.1	6.1	13	-0.33	0.15	0.15
85 TO 95	13	27.0			11.0	6.8	10	-0.06	0.26	0.16
95 TO 105	10	30.5			7.8	3.5	19	-0.26	0.21	0.09
105 TO 115	19	45.4			11.9	7.8	9	-0.24	0.30	0.19
115 TO 125	9	45.7			4.4	3.2	7	-0.07	0.27	0.20
125 TO 135	7	44.0			6.6	7.4	3	-0.13	0.12	0.13
135 TO 145	3									
145 TO 155										
155 TO 165										
165 TO 175										
175 TO 185										

BEARING DATA NOT USED

Figure 19. COMPUTE SENSOR ERROR program output (part 3).

LAWRENCE L. BROWN / COMPTON'S PROBLEM (part 4)

A VACUUM INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

ERRORS AS A FUNCTION OF RANGE FOR THE 2.5K RANGE SCALE			FORACS 7 REPORT NO 888, FIELD 21		
SONAR 999CB	JOAN CATHERINE	SS 9999	DATE: 12/25/76	FORACS 7 REPORT NO 888, FIELD 21	
17 688211	2500	SONAR 999CB	M D	50505050	GSDT
RANGE ERRORS BEARING ERRORS					
RANGE	NUMB	AVG	SD	CUNF	CONF
0 TO 250	250				
250 TO 500	500				
500 TO 750	750				
750 TO 1000	1000				
1000 TO 1250	1250				
1250 TO 1500	1500	5	-3.4	1.3	1.2
1500 TO 1750	1750	7	-2.7	4.4	3.3
1750 TO 2000	2000				
2000 TO 2250	2250	5	14.4	8.6	7.5
2250 TO 2500	2500	3	10.7	7.5	8.5
2500 TO 2750	2750	1	-5.0	0.0	0.0

Figure 19. COMPUTE SENSOR ERROR program output (part 5).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 2.5K RANGE SCALE  
 SONAR 999C8      JUAN CATHERINE SS 9999      DATE: 12/25/76      FORMATS REPORT TO ddd, FIELD 21  
 17 888211 25C0      SONAR 999C8      H D 55555550 GSUT

MODIFICATION IS INSTALLED

DEARING ERROR PARAMETERS ARE IN	
*****	* DEGREES *
*****	*****
MAXIMUM MEAN ERROR (MME)	LEARNING ERRORS
AVERAGE STANDARD DEVIATION (ASD)	RANGE ERRORS
	14.4
	0.00
PEAK-TO-VALLEY VARIATION (PVV)	0.00
MIDPOINT OF PVV (MP)	17.4
AVERAGE STANDARD DEVIATION	0.00
PEAK	0.00
VALLEY	-3.4
TOTAL NUMBER OF DATA POINTS	21
OVERALL MEAN	0.00
OVERALL STANDARD DEVIATION	3.2
MEAN OF ERRORS	0.03
NUMBER OF VALID INTERVALS	0
WEIGHTED AVERAGE STANDARD DEVIATION	5.2
AVERAGE OF VALID INTERVAL MEANS	0.60
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	2.8
MEAN OF ABSOLUTE ERRORS	0.00
A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS	6.8

THIS PROGRAM RUN ON 24 SEP 1976

THIS IS SENSOR NUMBER 3

Figure 19. COMPUTE SENSOR ERROR program output (part 6).

ERRORS AS A FUNCTION OF RANGE FOR THE 5.0K RANGE SCALE			RANGE ERRORS			BEARING ERRORS		
RANGE	NUMB	Avg	SD	CONF	NUMB	Avg	SD	CONF
0 TO 500	500							
500 TO 1000	1000							
1000 TO 1500	1500							
1500 TO 2000	2000	4	-17.6	14.3	14.0			
2000 TO 2500	2500							
2500 TO 3000	3000	6	19.7	6.2	4.9			
3000 TO 3500	3500	6	15.0	9.8	7.9			
3500 TO 4000	4000	1	20.0	0.0	0.0			
4000 TO 4500	4500	9	21.0	6.8	4.5			
4500 TO 5000	5000	5	19.6	10.5	9.2			
5000 TO 5500	5500							

Figure 19. COMPUTE SENSOR ERROR program output (part 7).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 5.0K RANGE SCALE  
 SONAR 999C8      JIAN CATHERINE      SS      9449      DATE: 12/25/76      FURAC 7 REPORT NO 888 FIELD 21  
 17 686211 5200      SONAR 999C8      H D      5055500 GUT

#### MODIFICATION IS INSTALLED

STEARING ERROR PARAMETERS ARE IN \*\*\*\* DEGREES \*\*\*\*  
 \*\*\*\* DEGREES \*\*\*\*

#### MAXIMUM MEAN ERROR (MME)

AVERAGE STANDARD DEVIATION (ASD)  
 PEAK-TO-VALLEY VARIATION (PVV)

MIDPOINT OF PVV (MP)

AVERAGE STANDARD DEVIATION  
 PEAK

VALLEY  
 TOTAL NUMBER OF DATA POINTS  
 OVERALL MEAN

OVERALL STANDARD DEVIATION  
 MEDIAN OF ERRORS

NUMBER OF VALID INTERVALS  
 WEIGHTED AVERAGE STANDARD DEVIATION  
 AVERAGE OF VALID INTERVAL MEANS  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS

MEAN OF ABSOLUTE ERRORS

0.00      31  
 0.00      14.3  
 0.00      12.2  
 0.00      20.0  
 0.00      5  
 0.00      d.4  
 0.00      11.2  
 0.00      19.6  
 0.00      1d.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 24 SEP 1976

THIS IS SENSOR NUMBER

Figure 19. COMPUTE SENSOR ERROR program output (part 8).

ERRORS AS A FUNCTION OF RANGE FOR THE 10.0K RANGE SCALE					
SONAR 999CB	JUAN CATHERINE	SS	9999	DATE: 12/25/76	FORACCS 7 REPORT NO 888, FIELD 21
	17 888211	10300	SONAR 999CB	M D	55505050 GSOT
RANGE	ERRORS			BEARING ERRORS	
RANGE	NUMB	Avg	SD	CONF	SD
0 TO 1000	1000				
1000 TO 2000	2000				
2000 TO 3000	3000	5	-25.2	10.0	8.8
3000 TO 4000	4000				
4000 TO 5000	5000				
5000 TO 6000	6000	6	12.7	7.6	6.0
6000 TO 7000	7000	6	12.0	7.6	6.1
7000 TO 8000	8000				
8000 TO 9000	9000	7	69.4	6.1	4.5
9000 TO 10000	10000	8	69.8	11.8	8.2
10000 TO 11000	11000				

Figure 19. COMPUTE SENSOR ERROR program output (part 9).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 10.0K RANGE SCALE

SONAR 999C8	JUAN CATHERINE	SS	9999	DATE: 12/25/76	FORACCS 7 REPORT NO 688, FIELD 21
	17 868211	10000	SUNAR 999C8	M D	50500050 GSDT

MODIFICATION IS INSTALLED

DEBREAKING ERROR PARAMETERS ARE IN DEGREES

	DEGREES	RANGE ERRORS
MAXIMUM MEAN ERROR (MME)	0.00	69.8
AVERAGE STANDARD DEVIATION (ASD)	0.00	8.0

PEAK-TU-VALLEY VARIATION (PVV)

	PVV	ERR
MIDPOINT OF PVV (MP)	0.00	54.2
AVERAGE STANDARD DEVIATION	0.09	12.3
PEAK	0.00	6.0
VALLEY	0.00	-25.2

TOTAL NUMBER OF DATA POINTS

	DATA POINTS	ERR
OVERALL MEAN	0.00	32
OVERALL STANDARD DEVIATION	0.00	33.3
MEDIAN OF ERRORS	0.00	37.8

NUMBER OF VALID INTERVALS

	VALID INTERVALS	ERR
MEAN OF VALID INTERVAL STANDARD DEVIATION	0.00	8.4
AVERAGE OF VALID INTERVAL MEANS	0.00	27.4
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.00	37.0

MEAN OF ABSOLUTE ERRORS

	ERR
MEAN OF ABSOLUTE ERRORS	0.00

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS IS SENSOR NUMBER

THIS PROGRAM RUN ON 29 SEP 1976

Figure 19. COMPUTE SENSOR ERROR program output (part 10).

## ERRORS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE

SONAR 999CB	JOAN CATHERINE	SS	9999	DATE: 12/25/76	FORAC 7 REPORT NO 888, FIELD 21
	17 888211	20000		SONAR 999CB	M D 50505050 GSOT
RANGE	NUMB	RANGE	ERRORS	B E A R I N G	ERRORS
			NUMB AVG SD CONF	NUMB AVG SD CONF	
0 TO 1000					
1000 TO 2000					
2000 TO 3000					
3000 TO 4000					
4000 TO 5000	6		-59.3	29.9	23.9
5000 TO 6000					
6000 TO 7000					
7000 TO 8000	1		-65.0	0.0	0.0
8000 TO 9000	5		-64.4	6.2	5.4
9000 TO 10000					
10000 TO 11000	6		-19.2	14.2	11.4
11000 TO 12000					
12000 TO 13000	6		-16.5	27.2	21.7
13000 TO 14000					
14000 TO 15000					
15000 TO 16000					
16000 TO 17000	6		-41.7	10.1	8.1
17000 TO 18000					
18000 TO 19000	5		-45.4	17.2	15.1
19000 TO 20000					
20000 TO 21000					

Figure 19. COMPUTE SENSOR ERROR program output (part 11).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE  
 SONAR 999C8      JOHN CATHERINE SS 9999      DATE: 12/25/76      FURNACES & REPORT NO. 665, FIELD 21  
 SONAR 999C8      17 88521 2870U      SONAR 999C8      MU      2020021 GSOF

MUDIFICATION IS INSTALLED

BEARING ERROR PARAMETERS ARE IN \* DEGREES \*

BEARING ERRORS

ENRUP'S

RANGE

ENRUP'S

-04.4

17.5

0.00

0.01

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

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0.00

0.00

0.00

0.00

MAXIMUM MEAN ERROR (MME)  
 AVERAGE STANDARD DEVIATION (ASD)

PEAK-TU-VALLEY VARIATION (PVV)

MIDPOINT OF PVV (MPV)

AVERAGE STANDARD DEVIATION

PEAK

VALLEY

TOTAL NUMBER OF DATA POINTS  
 OVERALL MEAN  
 OVERALL STANDARD DEVIATION  
 MEDIAN OF ERRORS

NUMBER OF VALID INTERVALS  
 WEIGHTED AVERAGE STANDARD DEVIATION  
 AVERAGE OF VALID INTERVAL MEANS  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS

MEAN OF ABSOLUTE ERRORS

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

0.00

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THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER

Figure 19. COMPUTE SENSOR ERROR program output (part 12).

## ERRORS AS A FUNCTION OF BEARING

GFCS 999C

JUAN CATHERINE SS 9999 DATE: 12/25/76

GFCS 999C T FURACS 7 REPORT NO 888, FILED 41

17 888412

BEARING	NUMB	RANGE	ERRORS	SD	CUNF	BEARING	ERRORS	SD	CONF
185 TO 195						3	-0.18	0.05	0.05
195 TO 205						9	-0.22	0.04	0.03
205 TO 215						9	-0.17	0.04	0.02
215 TO 225						5	-0.19	0.07	0.06
225 TO 235						13	-0.21	0.04	0.02
235 TO 245						7	-0.23	0.09	0.07
245 TO 255						2	-0.12	0.04	0.06
255 TO 265						11	-0.21	0.09	0.05
265 TO 275						7	-0.17	0.07	0.06
275 TO 285						2	-0.17	0.06	0.09
285 TO 295						5	-0.17	0.06	0.09
295 TO 305						48	-0.19	0.08	0.02
305 TO 315						70	-0.19	0.07	0.02
315 TO 325						21	-0.18	0.06	0.02
325 TO 335						24	-0.17	0.07	0.03
335 TO 345						26	-0.18	0.06	0.02
345 TO 355						8	-0.17	0.06	0.04
355 TO 35						7	-0.19	0.05	0.02
5 TO 15						5	-0.18	0.06	0.02
15 TO 25						8	-0.25	0.05	0.04
25 TO 35						12	-0.21	0.06	0.04
35 TO 45						10	-0.19	0.09	0.06
45 TO 55						7	-0.23	0.05	0.04
55 TO 65						6	-0.23	0.04	0.03
65 TO 75						4	-0.17	0.08	0.08
75 TO 85						5	-0.17	0.07	0.06
85 TO 95						1	-0.22	0.00	0.60
95 TO 105									
105 TO 115									
115 TO 125									
125 TO 135									
135 TO 145									
145 TO 155									
155 TO 165									
165 TO 175									
175 TO 185									

Figure 19. COMPUTE SENSOR ERROR program output (part 13).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING  
 GFC5 999C      J.D.N CATHERINE      SS      9999      DATE: 12/25/76  
 17 688.12      GFC5 999C      T      FUSAC 7 REPORT NU 860, FIELD 41

RADAR IN AUTO TRACK MODE

CLEARING ERROR PARAMETERS ARE IN \* MINUTES \*

PEAK-TC-VALLEY VARIATION (PVV)	BLATTING	BLATTING
AVERAGE OF PVV (AVG)	4.72	0.00
AVERAGE STANDARD DEVIATION (ASD)	-12.69	0.0
PEAK	3.78	0.0
VALLEY	-10.13	0.0
MAXIMUM MEAN ERROR (MME)	-14.85	0.0
AVERAGE STANDARD DEVIATION	3.78	0.0
TOTAL NUMBER OF DATA POINTS	335	0
OVERALL MEAN	-11.43	0.0
OVERALL STANDARD DEVIATION	4.31	0.0
MEDIAN OF ERRORS	-11.40	0.0
NUMBER OF VALID INTERVALS	23	0
WEIGHTED AVERAGE STANDARD DEVIATION	3.84	0.0
AVERAGE OF VALID INTERVAL MEANS	-11.07	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	11.07	0.0
MEAN OF ABSOLUTE ERRORS	11.43	0.0

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

7

THIS IS SENSOR NUMBER

THIS PROGRAM RUN ON 29 SEP 1976

Figure 19. COMPUTE SENSOR ERROR program output (part 14).

Figure 19. COMPUTE SENSOR ERROR program output (part 15).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 10.0K RANGE SCALE  
 JUAN CATHERINE SS 9999 DATE: 12/25/76 FORACCS T REPORT NO 888, FIELD 44  
 GFC'S 999C 17 88841 GFC'S 999C TP

BEARING ERROR PARAMETERS ARE IN \* MINUTES \*  
 \*\*\*\*\*  
 MAXIMUM MEAN ERROR (MME)  
 AVERAGE STANDARD DEVIATION (ASD)  
 PEAK-TO-VALLEY VARIATION (PVV)  
 MIDPOINT OF PVV (MP)  
 AVERAGE STANDARD DEVIATION  
 PEAK VALLEY

	RANGE
BEARING	10.0K
MAXIMUM	0.00
AVERAGE	0.00
PEAK	-16.4
VALLEY	-16.4

TOTAL NUMBER OF DATA POINTS 337  
 OVERALL MEAN 0.00 -14.9  
 OVERALL STANDARD DEVIATION 0.00 4.2  
 MEDIAN OF ERRORS 0.00 -15.3

NUMBER OF VALID INTERVALS 0 0  
 WEIGHTED AVERAGE STANDARD DEVIATION 0.00 4.2  
 AVERAGE OF VALID INTERVAL MEANS 0.00 -15.0  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS 0.00 15.3

MEAN OF ABSOLUTE ERRORS 0.00 14.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SENSOR NUMBER

Figure 19. COMPUTE SENSOR ERROR program output (part 16).

## ERRORS AS A FUNCTION OF BEARING

SS RADAR 999A 990

JUAN CATHERINE SS 9999 DATE: 12/25/76

FOKACS 7 REPORT NO 888, FIELD 61

17 888612

SS RADAR 999A 990

BEARING	NUMBER	RANGE	ERRORS	CONF	NUMB	BEARING	ERRORS	CONF	NUMB	BEARING	ERRORS	CONF
165 TO 195						16	-0.26			16	-0.29	
195 TO 205						35	-0.20			35	-0.22	
205 TO 215						16	0.07			16	0.08	
215 TO 225						16	0.19			16	0.09	
225 TO 235						16	0.02			16	0.02	
235 TO 245						16	0.39			16	0.18	
245 TO 255						16	0.06			16	0.16	
255 TO 265						16	0.31			16	0.16	
265 TO 275						19	-0.32			19	0.10	
275 TO 285						11	-0.29			11	-0.29	
285 TO 295						7	0.22			7	0.17	
295 TO 305						8	0.19			8	0.16	
305 TO 315						8	-0.05			8	0.18	
315 TO 325						11	0.03			11	0.19	
325 TO 335						20	-0.16			20	0.12	
335 TO 345						11	-0.14			11	0.07	
345 TO 355						12	-0.34			12	-0.25	
355 TO 365						7	-0.21			7	0.13	
5 TO 15						10	0.23			10	0.10	
15 TO 25						4	0.32			4	0.25	
25 TO 35						7	0.01			7	0.22	
35 TO 45						8	-0.50			8	0.19	
45 TO 55						11	-0.41			11	0.37	
55 TO 65						10	-0.10			10	0.42	
65 TO 75						13	-0.19			13	0.23	
75 TO 85						7	-0.48			7	0.11	
85 TO 95						11	-0.35			11	0.14	
95 TO 105						11	-0.71			11	0.45	
105 TO 115						9	-0.70			9	0.27	
115 TO 125						13	-0.39			13	0.20	
125 TO 135						9	-0.35			9	0.14	
135 TO 145						8	-0.49			8	0.16	
145 TO 155												
155 TO 165												
165 TO 175												
175 TO 185												

Figure 19. COMPUTE SENSOR ERROR program output (part 17).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING  
 SS RADAR 995A 990 JUAN CATHERINE SS DATE: 12/25/76  
 LT 888612 SS RADAR 995A 990 FORCAST REPORT NO 868, FIELD 61

BEARING ERROR PARAMETERS ARE IN \* DEGREES \*  
 \*\*\*\*\*  
 PEAK-FC-VALLEY VARIATION (PVV)  
 MIDPOINT OF PVV (MP)  
 AVERAGE STANDARD DEVIATION (ASD)  
 PEAK  
 VALLEY  
 MAXIMUM MEAN ERROR (MME)  
 AVERAGE STANDARD DEVIATION  
 TOTAL NUMBER OF DATA POINTS  
 OVERALL MEAN  
 OVERALL STANDARD DEVIATION  
 MEDIAN OF ERRORS  
 NUMBER OF VALID INTERVALS  
 WEIGHTED AVERAGE STANDARD DEVIATION  
 AVERAGE OF VALID INTERVAL MEANS  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS  
 MEAN OF ABSOLUTE ERRORS

	PEAKING ERRORS	MIDPOINT ERRORS	AVERAGE ERRORS	VALLEY ERRORS
PEAK-FC-VALLEY VARIATION (PVV)	1.03	59.0	42.2	28.7
MIDPOINT OF PVV (MP)	-0.20	0.27	0.27	0.32
AVERAGE STANDARD DEVIATION (ASD)	0.32	72.4	72.4	12.7
PEAK	-0.71	0.27	0.27	0.27
VALLEY	1.27	1.27	1.27	1.27
MAXIMUM MEAN ERROR (MME)	-0.71	72.3	72.3	28.7
AVERAGE STANDARD DEVIATION	0.32	0.27	0.27	0.27
TOTAL NUMBER OF DATA POINTS	331	333	333	333
OVERALL MEAN	-0.21	42.8	42.8	42.8
OVERALL STANDARD DEVIATION	0.35	35.9	35.9	35.9
MEDIAN OF ERRORS	-0.23	46.2	46.2	46.2
NUMBER OF VALID INTERVALS	26	26	26	26
WEIGHTED AVERAGE STANDARD DEVIATION	0.27	32.2	32.2	32.2
AVERAGE OF VALID INTERVAL MEANS	-0.22	45.6	45.6	45.6
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.27	45.6	45.6	45.6
MEAN OF ABSOLUTE ERRORS	0.33	48.9	48.9	48.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS IS SENSOR NUMBER 9

Figure 19. COMPUTE SENSOR ERROR program output (part 18).

THIS PROGRAM RUN ON 29 SEP 1976

ERRORS AS A FUNCTION OF RANGE FOR THE			8.0K RANGE SCALE			FORAC 7 REPORT NO 888, FIELD 6A		
SS RADAR 999A 99D	JUAN CATHERINE	SS 9999	DATE: 12/25/76	SS RADAR 999A 99D	DATE: 12/25/76	FORAC 7 REPORT NO 888, FIELD 6A	SS RADAR 999A 99D	DATE: 12/25/76
17 888611 8000		SS RADAR 999A 99D						
RANGE	NUMBER	Avg	SD	CNF		BEARING	NUMBER	AVG
RANGE	NUMBER	Avg	SD	CNF		BEARING	NUMBER	AVG
0 TO 1000	1000	7	38.9	30.1	22.3	6	-0.16	0.17
1000 TO 2000	2000	26	35.5	21.7	8.3	25	-0.28	0.41
2000 TO 3000	3000	10	71.8	16.3	10.1	11	0.12	0.16
3000 TO 4000	4000	15	58.7	14.3	7.2	15	-0.56	0.25
4000 TO 5000	5000	61	62.2	22.0	5.5	60	-0.26	0.13
5000 TO 6000	6000	9	59.7	17.4	11.4	9	-0.11	0.07
6000 TO 7000	7000	8	56.9	28.3	19.6	8	-0.31	0.20
7000 TO 8000	8000							
8000 TO 9000	9000							

Figure 19. COMPUTE SENSOR ERROR program output (part 19).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 6.0K RANGE SCALE  
 SS RADAR 999A 99D      JUAN CATHERINE SS 9999      DATE: 12/25/76      FORACCS 7 REPORT NO 888, FIELD 61  
 SS RADAR 999A 99D      LT 888611 8300      SS RADAR 999A 99D

BEARING ERROR PARAMETERS ARE IN \* DEGREES \*  
 \*\*\*\*\*  
 BEARING ERRORS      BEARING ERRORS  
 MAXIMUM MEAN ERROR (MME) -0.56      71.8  
 AVERAGE STANDARD DEVIATION (ASD) 0.24      21.4  
 PEAK-TO-VALLEY VARIATION (PVV)  
 MIDPOINT OF PVV (MP)  
 AVERAGE STANDARD DEVIATION  
 PEAK  
 VALLEY

TOTAL NUMBER OF DATA POINTS	134	136
OVERALL MEAN	-0.26	55.7
OVERALL STANDARD DEVIATION	0.33	24.3
MEDIAN OF ERROS	-0.28	58.0

NUMBER OF VALID INTERVALS      7  
 WEIGHTED AVERAGE STANDARD DEVIATION      6.29      21.5  
 AVERAGE OF VALID INTERVAL MEANS      -0.23      54.4  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS      0.26      54.4  
 MEAN OF ABSOLUTE ERRORS      0.34      55.9

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS IS SENSOR NUMBER 10  
 THIS PROGRAM RUN ON 29 SEP 1976  
 Figure 19. COMPUTE SENSOR ERROR program output (part 20).

ERRORS AS A FUNCTION OF RANGE FOR THE 10.0K RANGE SCALE						FORACS 7 REPORT NO 888, FIELD 61					
SS RADAR 999A 990			JUN CATHERINE SS 9999			DATE: 12/25/76			SS RADAR 999A 990		
17 888611 10000			SS RADAR 999A 990			BEARING			ERRORS		
RANGE	NUMB	Avg	RANGE	ERRORS	SD	CONF	NUMB	Avg	SD	CONF	SD
0 TO 1000	1000		0 TO 1000	24.9	27.0	11.3	22	-0.10	0.31	0.13	
1000 TO 2000	2000		2000 TO 3000	74	38.5	25.2	5.7	74	0.03	0.30	0.07
2000 TO 3000	3000		3000 TO 4000	16	54.4	23.2	11.3	16	-0.61	0.30	0.15
4000 TO 5000	4000		5000 TO 6000	9	50.2	32.0	20.9	9	-0.56	0.19	0.13
5000 TO 6000	6000		6000 TO 7000	8	59.4	28.4	19.7	8	-0.42	0.15	0.10
6000 TO 7000	7000		7000 TO 8000	6	47.2	20.6	16.4	6	-0.35	0.13	0.11
7000 TO 8000	8000		8000 TO 9000	7	43.4	23.0	17.0	7	-0.56	0.34	0.25
8000 TO 9000	9000		9000 TO 10000	12	10.2	27.5	15.5	12	-0.31	0.32	0.18
10000 TO 11000	11000										

Figure 19. COMPUTE SENSOR ERROR program output (part 21).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 10-OK RANGE SCALE  
 SS RADAR 999A 99D      JCN CATHERINE      SS 9999      DATE: 12/29/76      FCRACS 7 REPORT NO 868, FIELD 61  
 17 6666 11 10000      SS RADAR 999A 99D

BEARING ERROR PARAMETERS ARE IN \* DEGREES \*  
 \*\*\*\*\*  
 MAXIMUM MEAN ERROR (MME)  
 AVERAGE STANDARD DEVIATION (ASD)  
 PEAK-TO-VALLEY VARIATION (PVV)  
 MIDPOINT OF PVV (MP)  
 AVERAGE STANDARD DEVIATION  
 PEAK  
 VALLEY

	BEARING	RANGE
ERRORS	ERRORS	ERRORS
-0.61	59.4	
0.26	25.4	
		49.2
		-0.29
		34.4
		0.26
		25.4
0.03	59.4	
-0.01	10.2	

TOTAL NUMBER OF DATA POINTS  
 OVERALL MEAN  
 OVERALL STANDARD DEVIATION  
 MEDIAN OF ERRORS

NUMBER OF VALID INTERVALS  
 WEIGHTED AVERAGE STANDARD DEVIATION  
 AVERAGE OF VALID INTERVAL MEANS  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS  
 MEAN OF ABSOLUTE ERRORS

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS IS SENSOR NUMBER

THIS PROGRAM RUN ON 29 SEP 1976

11

Figure 19. COMPUTE SENSOR ERROR program output (part 22).

ERRORS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE

SS RADAR 999A 99D		JUAN CATHERINE SS 9999		DATE: 12/25/76		FORAC 7 REPORT NO 888, FIELD 61	
		17 888611 20060		SS RADAR 999A 990			
RANGE	NUMB	RANGE ERRORS		BEARING ERRORS		ERRORS	
		Avg	SD	CNCF	NUMB	Avg	SD
0 TO 1000	1000						
1000 TO 2000	1000						
2000 TO 3000	2000						
3000 TO 4000	3000						
4000 TO 5000	4000						
5000 TO 6000	5000						
6000 TO 7000	6000						
7000 TO 8000	7000						
8000 TO 9000	8000						
9000 TO 10000	9000						
10000 TO 11000	10000						
11000 TO 12000	11000						
12000 TO 13000	12000						
13000 TO 14000	13000						
14000 TO 15000	14000						
15000 TO 16000	15000						
16000 TO 17000	16000						
17000 TO 18000	17000						
18000 TO 19000	18000						
19000 TO 20000	19000						
20000 TO 21000	20000						

Figure 19. COMPUTE SENSOR ERROR program output (part 23).

LISTING OF ERROR STATISTICS AS A FUNCTION OF RANGE FOR THE 20.0K RANGE SCALE  
 SS RAUAR 99A 9:20      JUAN CATHKINE SS 5999      DATE: 12/2/76      FURACIS REPORT NO 88a, FIELD 61  
 LT 888611 2000      SS RAUAR 99A 590

BEARING ERROR PARAMETERS ARE IN * DEGREES *	
	BEARING ERRORS
MAXIMUM MEAN ERROR (INME)	-0.53
AVERAGE STANDARD DEVIATION (ASD)	0.19
PEAK-TO-VALLEY VARIATION (PVV)	1.59
MIDPOINT OF PVV (MP)	0.59
AVERAGE STANDARD DEVIATION	0.23
PEAK VALLEY	0.19
TOTAL NUMBER OF DATA POINTS	43
OVERALL MEAN	-0.17
OVERALL STANDARD DEVIATION	0.20
MEDIAN OF ERRORS	-0.12
NUMBER OF VALID INTERVALS	7
WEIGHTED AVERAGE STANDARD DEVIATION	0.29
AVERAGE OF VALID INTERVAL MEANS	-0.18
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.20
MEAN OF ABSOLUTE ERRORS	0.24

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FIVE DATA POINTS

12

THIS IS SENSOR NUMBER

Figure 19. COMPUTE SENSOR ERROR program output (part 24).

THIS PROGRAM RUN ON 29 SEP 1976

## ERRORS AS A FUNCTION OF BEARING

PER 999A	ABC	JUAN CATHERINE	SS	9999	DATE: 12/25/76	FORACS 7 REPORT NO 888A FIELD 73
17	888732				Q - 6	0

PER 999A ABC SS 9999 DATE: 12/25/76 FORACS 7 REPORT NO 888A FIELD 73

9

BEARING	NUMBER	RANGE ERRORS			BEARING ERRORS		
		Avg	SD	CONF	NUMB	Avg	SD
185 TO 195					3	-0.05	0.03
195 TO 205					8	-0.06	0.03
205 TO 215					8	-0.09	0.02
215 TO 225					6	-0.08	0.01
225 TO 235					6	-0.07	0.01
235 TO 245					2	-0.06	0.00
245 TO 255					4	-0.08	0.04
255 TO 265					5	-0.08	0.03
265 TO 275					5	-0.10	0.03
275 TO 285					6	-0.06	0.02
285 TO 295					7	-0.08	0.01
295 TO 305					4	-0.09	0.03
305 TO 315					2	-0.11	0.07
315 TO 325					3	-0.10	0.04
325 TO 335					2	-0.10	0.01
335 TO 345					2	-0.08	0.02
345 TO 355					4	-0.05	0.04
355 TO 5					7	-0.04	0.02
5 TO 15					6	-0.14	0.03
15 TO 25					4	-0.03	0.04
25 TO 35					6	-0.06	0.02
35 TO 45					4	-0.08	0.01
45 TO 55					4	-0.09	0.01
55 TO 65					6	-0.13	0.01
65 TO 75					4	-0.11	0.01
75 TO 85					4	-0.10	0.01
85 TO 95					3	-0.09	0.01
95 TO 105					4	-0.06	0.01
105 TO 115					8	-0.06	0.01
115 TO 125					6	-0.05	0.02
125 TO 135					5	-0.05	0.02
135 TO 145					7	-0.05	0.03
145 TO 155					7	-0.07	0.02
155 TO 165					4	-0.05	0.01
165 TO 175					7	-0.06	0.03
175 TO 185					7	-0.07	0.02

Figure 19. COMPUTE SENSOR ERROR program output (part 25).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

BEARING ERROR PARAMETERS ARE IN \* MINUTES \*

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

\*\*\*\*\*  
BEARING ERROR PARAMETERS ARE IN \* MINUTES \*  
\*\*\*\*\*

PEAK-TO-VALLEY VARIATION (PVV)  
MIDPOINT OF PVV (MP)  
AVERAGE STANDARD DEVIATION (ASD)  
PEAK  
VALLEY

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

MAXIMUM MEAN ERROR (IME)  
AVERAGE STANDARD DEVIATION

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

TOTAL NUMBER OF DATA POINTS  
OVERALL MEAN  
OVERALL STANDARD DEVIATION  
MEDIAN OF ERRORS

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

NUMBER OF VALID INTERVALS  
WEIGHTED AVERAGE STANDARD DEVIATION  
OVERALL MEAN  
AVERAGE OF VALID INTERVAL MEANS  
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

MEAN OF ABSOLUTE ERRORS

PER 999A ABC	JOAN CATHERINE	SS	9599	DATE: 12/25/76	FCRACS T REPORT NO 860, FIELD 73
17 850732				PER 999A ADC =	4 0 - 6 0 9

FOR PENTISCOPE CALIBRATION, A VALID INTERVAL IS ONE WITH A MINIMUM OF THREE DATA POINTS

YFAH, YHU	GUT A	B	CADU WITH	LM	=	0.00
LOW POWER:	Af =	-0.04	LM			0.00
HIGH POWER:	AE =	-C.RG	LM			0.00

THIS IS SENSOR NUMBER 13

THIS PROGRAM RUN ON 29 SEP 1976

Figure 19. COMPUTE SENSOR ERROR program output (part 26).

## ERRORS AS A FUNCTION OF BEARING

PER 999A ABC

JOAN CATHERINE SS 9999

17 888742

FORACS 7 REPORT NO 888, FIELD 74

9

BEARING	NUMB	RANGE			ERRORS			BEARING			ERRORS		
		Avg	SD	CONF	NUMB	Avg	SD	CONF	NUMB	Avg	SD	CONF	
185 TO 195	6	-0.01	0.04	0.03	195 TO 205	4	0.01	0.01	195 TO 205	4	0.01	0.01	
205 TO 215	5	-0.01	0.03	0.03	215 TO 225	6	0.04	0.03	215 TO 225	6	0.04	0.02	
225 TO 235	8	-0.02	0.03	0.02	235 TO 245	5	-0.02	0.03	235 TO 245	5	-0.02	0.02	
245 TO 255	6	-0.00	0.03	0.03	255 TO 265	9	-0.01	0.03	255 TO 265	9	-0.01	0.02	
265 TO 275	5	-0.03	0.02	0.02	275 TO 285	7	0.02	0.02	275 TO 285	7	0.02	0.01	
285 TO 295	6	0.03	0.02	0.01	295 TO 305	6	0.02	0.03	295 TO 305	6	0.02	0.03	
305 TO 315	6	0.02	0.03		315 TO 325	7	0.00	0.01	315 TO 325	7	0.00	0.01	
325 TO 335	2	0.01	0.03		335 TO 345	6	-0.01	0.01	335 TO 345	6	-0.01	0.01	
345 TO 355	4	-0.02	0.05		355 TO 5	4	-0.03	0.02	355 TO 5	4	-0.03	0.02	
5 TO 15	6	-0.03	0.04		15 TO 25	5	-0.05	0.04	15 TO 25	5	-0.05	0.03	
25 TO 35	5	-0.06	0.04		35 TO 45	6	-0.06	0.02	35 TO 45	6	-0.06	0.02	
45 TO 55	7	-0.06	0.03		55 TO 65	5	-0.04	0.02	55 TO 65	5	-0.04	0.02	
65 TO 75	4	-0.05	0.02		75 TO 85	2	-0.06	0.04	75 TO 85	2	-0.06	0.02	
85 TO 95	1	-0.02	0.00		95 TO 105	1	-0.02	0.00	95 TO 105	1	-0.02	0.00	
105 TO 115	6	-0.01	0.02		115 TO 125	6	-0.02	0.02	105 TO 115	6	-0.02	0.02	
125 TO 135	4	-0.05	0.02		135 TO 145	6	-0.01	0.02	125 TO 135	6	-0.01	0.02	
145 TO 155	4	-0.00	0.03		155 TO 165	7	0.01	0.02	145 TO 155	4	-0.00	0.03	
165 TO 175	7	0.01	0.01		175 TO 185	3	0.01	0.02	165 TO 175	7	0.01	0.01	

Figure 19. COMPUTE SENSOR ERROR program output (part 27).

LISTINGS OF EMISSIONS AND SAVINGS

PER 599A ABC JUAN CATHLINE 55 9999 DATE: 12/25/76  
17 88842 PER 599A 12/25/76

\*\*\*\*\* BEARING ERROR PARAMETERS ARE IN \* MINUTES \*

KANGÉ

PREFACE

### MIDPOINT OF PVV (MP)

SOCIETY FOR THE HISTORY OF MEDICINE

SPEAK  
WAI-IC-Y

### MAXIMUM MEAN ERROR (IMME) AVERAGE STANDARD DEVIATION

TOTAL NUMBER OF DATA POINTS
OVERALL MEAN
OVERALL STANDARD DEVIATION

NUMBER OF VALID INTERVALS	WEIGHTED AVERAGE STANDARD DEVIATION OF VALID INTERVAL	AVERAGE OF VALID INTERVAL	STANDARD DEVIATION OF VALID INTERVAL
10	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000
30	0.0000	0.0000	0.0000
40	0.0000	0.0000	0.0000
50	0.0000	0.0000	0.0000
60	0.0000	0.0000	0.0000
70	0.0000	0.0000	0.0000
80	0.0000	0.0000	0.0000
90	0.0000	0.0000	0.0000
100	0.0000	0.0000	0.0000
110	0.0000	0.0000	0.0000
120	0.0000	0.0000	0.0000
130	0.0000	0.0000	0.0000
140	0.0000	0.0000	0.0000
150	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000
170	0.0000	0.0000	0.0000
180	0.0000	0.0000	0.0000
190	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
220	0.0000	0.0000	0.0000
230	0.0000	0.0000	0.0000
240	0.0000	0.0000	0.0000
250	0.0000	0.0000	0.0000
260	0.0000	0.0000	0.0000
270	0.0000	0.0000	0.0000
280	0.0000	0.0000	0.0000
290	0.0000	0.0000	0.0000
300	0.0000	0.0000	0.0000
310	0.0000	0.0000	0.0000
320	0.0000	0.0000	0.0000
330	0.0000	0.0000	0.0000
340	0.0000	0.0000	0.0000
350	0.0000	0.0000	0.0000
360	0.0000	0.0000	0.0000
370	0.0000	0.0000	0.0000
380	0.0000	0.0000	0.0000
390	0.0000	0.0000	0.0000
400	0.0000	0.0000	0.0000
410	0.0000	0.0000	0.0000
420	0.0000	0.0000	0.0000
430	0.0000	0.0000	0.0000
440	0.0000	0.0000	0.0000
450	0.0000	0.0000	0.0000
460	0.0000	0.0000	0.0000
470	0.0000	0.0000	0.0000
480	0.0000	0.0000	0.0000
490	0.0000	0.0000	0.0000
500	0.0000	0.0000	0.0000
510	0.0000	0.0000	0.0000
520	0.0000	0.0000	0.0000
530	0.0000	0.0000	0.0000
540	0.0000	0.0000	0.0000
550	0.0000	0.0000	0.0000
560	0.0000	0.0000	0.0000
570	0.0000	0.0000	0.0000
580	0.0000	0.0000	0.0000
590	0.0000	0.0000	0.0000
600	0.0000	0.0000	0.0000
610	0.0000	0.0000	0.0000
620	0.0000	0.0000	0.0000
630	0.0000	0.0000	0.0000
640	0.0000	0.0000	0.0000
650	0.0000	0.0000	0.0000
660	0.0000	0.0000	0.0000
670	0.0000	0.0000	0.0000
680	0.0000	0.0000	0.0000
690	0.0000	0.0000	0.0000
700	0.0000	0.0000	0.0000
710	0.0000	0.0000	0.0000
720	0.0000	0.0000	0.0000
730	0.0000	0.0000	0.0000
740	0.0000	0.0000	0.0000
750	0.0000	0.0000	0.0000
760	0.0000	0.0000	0.0000
770	0.0000	0.0000	0.0000
780	0.0000	0.0000	0.0000
790	0.0000	0.0000	0.0000
800	0.0000	0.0000	0.0000
810	0.0000	0.0000	0.0000
820	0.0000	0.0000	0.0000
830	0.0000	0.0000	0.0000
840	0.0000	0.0000	0.0000
850	0.0000	0.0000	0.0000
860	0.0000	0.0000	0.0000
870	0.0000	0.0000	0.0000
880	0.0000	0.0000	0.0000
890	0.0000	0.0000	0.0000
900	0.0000	0.0000	0.0000
910	0.0000	0.0000	0.0000
920	0.0000	0.0000	0.0000
930	0.0000	0.0000	0.0000
940	0.0000	0.0000	0.0000
950	0.0000	0.0000	0.0000
960	0.0000	0.0000	0.0000
970	0.0000	0.0000	0.0000
980	0.0000	0.0000	0.0000
990	0.0000	0.0000	0.0000
1000	0.0000	0.0000	0.0000

FOR PERISCOPE CALIBRATION, A VALID INTERVAL IS ONE WITH A MINIMUM OF THREE DATA POINTS

FOR THIS PERISCOPE CALIBRATION AND THE PRECEDING ONE, THESE VALUES ARE OBTAINED		
DEGREES	MINUTES	
-0.05	-2° 15'	
0.07	4° 15'	
		LIGHT ALIGNMENT ERROR (AE)
		LAST POSITION (LM)

THIS PROGRAM RUN ON 29 SEP 1976

Figure 19. COMPUTE SENSOR ERROR program output (part 28).

THIS IS SENSOR NUMBER 1

## ERRORS AS A FUNCTION OF BEARING

PEL ALID 999 99

99

JOAN CATHERINE SS 9999 DATE: 12/25/76 FORAC 7 REPORT NO 888, FIELD 81

17 886812

PEL ALID 999 99

## R A N G E   E R R O R S

BEARING      NUMB      AVG      SD      CONF

BEARING	NUMB	AVG	SD	CONF	NUMB	Avg	SD	CONF
185 TO 195					4	-0.72	0.15	0.15
195 TO 205					9	-0.65	0.14	0.09
205 TO 215					7	-0.68	0.13	0.10
215 TO 225					5	-0.64	0.13	0.12
225 TO 235					6	-0.61	0.05	0.04
235 TO 245					7	-0.48	0.17	0.13
245 TO 255					13	-0.61	0.15	0.08
255 TO 265					3	-0.58	0.06	0.07
265 TO 275					8	-0.60	0.13	0.09
275 TO 285					9	-0.62	0.14	0.09
285 TO 295					8	-0.61	0.18	0.13
295 TO 305					17	-0.67	0.10	0.05
305 TO 315					12	-0.63	0.11	0.06
315 TO 325					6	-0.61	0.18	0.14
325 TO 335					17	-0.51	0.14	0.07
335 TO 345					12	-0.50	0.07	0.04
345 TO 355					8	-0.39	0.17	0.12
355 TO 365					10	-0.39	0.10	0.06
5 TO 15								
15 TO 25								
25 TO 35								
35 TO 45								
45 TO 55								
55 TO 65								
65 TO 75								
75 TO 85								
85 TO 95								
95 TO 105								
105 TO 115								
115 TO 125								
125 TO 135								
135 TO 145								
145 TO 155								
155 TO 165								
165 TO 175								
175 TO 185								

Figure 19. COMPUTE SENSOR ERROR program output (part 29).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING  
 PEL ALID 999 99      JOAN CATHERINE SS 5999      DATE: 12/25/76      FORMATS & REPORT NO 8000, FIELD 61  
 17 068812      PEL ALID 999 99

PURT PELORUS

BEARING ERROR PARAMETERS ARE IN \*\*\*\*  
 \* DEGREES \*  
 \*\*\*\*\*

BEARING  
ERRORS

PEAK-TO-VALLEY VARIATION (PVV)  
 MIDPOINT OF PVV (MP)  
 AVERAGE STANDARD DEVIATION (ASD)  
 PEAK  
 VALLEY

MAXIMUM MEAN ERROR (MME)  
 AVERAGE STANDARD DEVIATION

TOTAL NUMBER OF DATA POINTS  
 OVERALL MEAN  
 OVERALL STANDARD DEVIATION  
 MEDIAN OF ERRORS

NUMBER OF VALID INTERVALS  
 WEIGHTED AVERAGE STANDARD DEVIATION  
 AVERAGE OF VALID INTERVAL MEANS  
 AVERAGE OF VALID INTERVAL ABSOLUTE MEANS

MEAN OF ABSOLUTE ERRORS  
 A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FIFTEEN DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976

THIS IS SET 50 NUMBER 15

Figure 19. COMPUTE SENSOR ERROR program output (part 30).

## ERRORS AS A FUNCTION OF BEARING

PFL ALID 999 99 DATE: 12/25/76 FORACS 7 REPORT NO 888, FIELD 82

JUAN CATHERINE SS 9999 PFL ALID 999 99

117 886822

GEARING	NUMB	R A N G E      E R R O R S		B E A R I N G      E R R O R S				
		Avg	SD	CONF	NUMB	Avg	SD	CONF
165 TO 195					2	-0.20	0.48	
195 TO 205					12	-0.44	0.14	0.08
205 TO 215					4	-0.40	0.12	0.12
215 TO 225					4	-0.43	0.09	0.09
225 TO 235					9	-0.24	0.17	0.11
235 TO 245					13	-0.26	0.14	0.08
245 TO 255					8	-0.34	0.19	0.13
255 TO 265					12	-0.24	0.15	0.09
265 TO 275					11	-0.18	0.07	0.04
275 TO 285					7	-0.24	0.11	0.08
285 TO 295					7	-0.30	0.23	0.17
295 TO 305					11	-0.21	0.10	0.06
305 TO 315					4	-0.26	0.05	0.05
315 TO 325					5	-0.13	0.14	0.12
325 TO 335					8	-0.24	0.12	0.08
335 TO 345					9	-0.28	0.19	0.12
345 TO 355					2	-0.31	0.06	0.08
355 TO 365					1	-0.37	0.60	0.60
365 TO 375								
375 TO 385								
385 TO 395								
395 TO 405								
405 TO 415								
415 TO 425								
425 TO 435								
435 TO 445								
445 TO 455								
455 TO 465								
465 TO 475								
475 TO 485								
485 TO 495								
495 TO 505								
505 TO 515								
515 TO 525								
525 TO 535								
535 TO 545								
545 TO 555								
555 TO 565								
565 TO 575								
575 TO 585								
585 TO 595								
595 TO 605								
605 TO 615								
615 TO 625								
625 TO 635								
635 TO 645								
645 TO 655								
655 TO 665								
665 TO 675								
675 TO 685								
685 TO 695								
695 TO 705								
705 TO 715								
715 TO 725								
725 TO 735								
735 TO 745								
745 TO 755								
755 TO 765								
765 TO 775								
775 TO 785								
785 TO 795								
795 TO 805								
805 TO 815								
815 TO 825								
825 TO 835								
835 TO 845								
845 TO 855								
855 TO 865								
865 TO 875								
875 TO 885								
885 TO 895								
895 TO 905								
905 TO 915								
915 TO 925								
925 TO 935								
935 TO 945								
945 TO 955								
955 TO 965								
965 TO 975								
975 TO 985								
985 TO 995								
995 TO 1005								
1005 TO 1015								
1015 TO 1025								
1025 TO 1035								
1035 TO 1045								
1045 TO 1055								
1055 TO 1065								
1065 TO 1075								
1075 TO 1085								

Figure 19. COMPUTE SENSOR ERROR program output (part 31).

LISTING OF ERROR STATISTICS AS A FUNCTION OF BEARING  
 FEL ALID 999 99 JUAN CANTINNE SS 9999 DATE: 12/20/76 FURACSY REPORT NO 638, FIELD 32  
 L7 HABE22 PEL ALID 999 99

STARBOARD PELORUS

BEARING ERROR PARAMETERS ARE IN \*\*\*\* DEGREES \*  
 \*\*\*\* DEGREES \*

	BEARING	RANGE
PEAK-TO-VALLEY VARIATION (PVV)	0.31	0.0
MIDPOINT OF PVV (MPV)	-0.29	0.0
AVERAGE STANDARD DEVIATION (ASD)	0.14	0.0
PEAK	-0.13	0.2
VALLEY	-0.44	0.0

	MAXIMUM MEAN ERROR (MMED)	0.0
AVERAGE STANDARD DEVIATION	0.14	0.0

	TOTAL NUMBER OF DATA POINTS	0
OVERALL MEAN	129	0
OVERALL STANDARD DEVIATION	-0.27	0.0
MEDIAN OF ERRORS	0.16	0.0
	-0.26	0.0

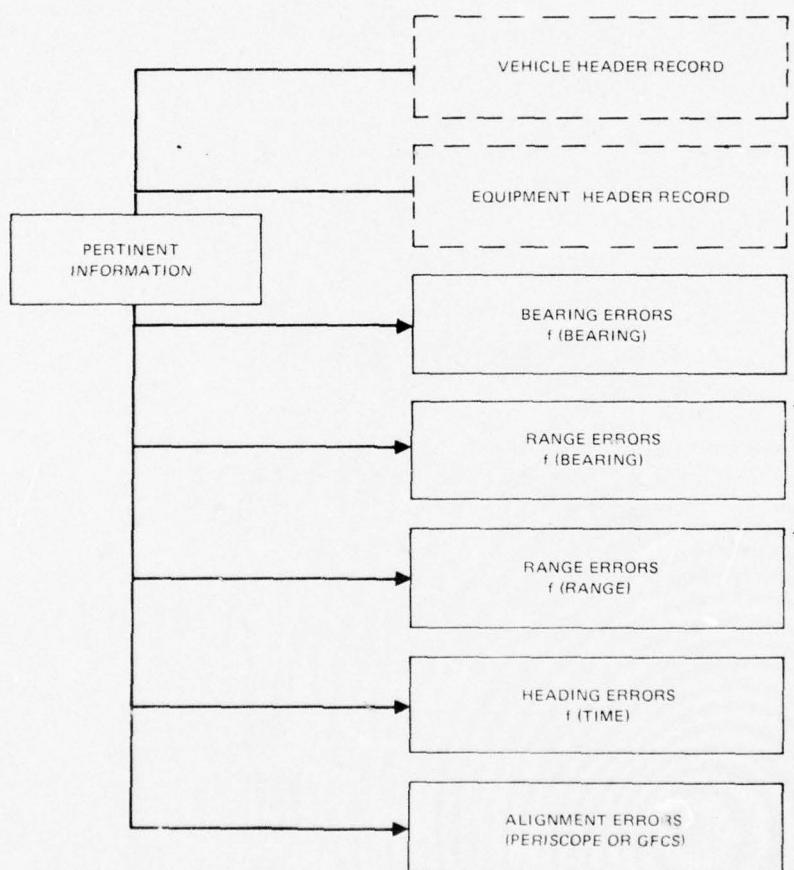
	NUMBER OF VALID INTERVALS	12
WEIGHTED AVERAGE STANDARD DEVIATION	0.14	0.0
AVERAGE OF VALID INTERVAL MEANS	-0.28	0.0
AVERAGE OF VALID INTERVAL ABSOLUTE MEANS	0.26	0.0
MEAN OF ABSOLUTE ERRORS	0.28	0.0

A VALID INTERVAL IS DEFINED AS HAVING AT LEAST FOUR DATA POINTS

THIS PROGRAM RUN ON 29 SEP 1976  
 THIS IS SENSOR NUMBER 16  
 Figure 19. COMPUTE SENSOR ERROR program output (part 32).

## SUMMARY DATA BANK PROGRAM

The input to this program is the data tape of the COMPUTE SENSOR ERROR program. The program skips the sectored output and transfers selected information from vehicle and equipment header cards to the summarized data records (fig 20). The information transferred by this program consists of the records shown in table 19. Statistical information contained in this data bank includes number of marks, mean or bias, standard deviation, median, peak-to-valley variation, midpoint, average standard deviation, and maximum error. The information shown in table 19 is added to the records shown as tables 13 through 18.



- \*THESE HAVE THE FOLLOWING  
STATISTICAL VALUES:
- NUMBER OF DATA MARKS
  - MEAN OR BIAS
  - STANDARD DEVIATION
  - MEDIAN
  - PEAK-TO VALLEY VARIATION
  - MIDPOINT
  - AVERAGE STANDARD DEVIATION
  - MAXIMUM ERROR

Figure 20. SUMMARY DATA BANK program output.

TABLE 19. SUMMARY DATA BANK CARD PUNCHING.

Column	Data	Remarks
<b>GYRO ERROR</b>		
65	Type test (ie, WSAT)	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 43-42 of Equipment Header Card
<b>BEARING ERROR</b>		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	Sonar or GFCS operational mode. R = RDT 0 = ODT, etc for sonar, T = auto, M = manual, etc for GFCS
67	Modification change	Sonar
68-70	Range scale	In hundreds of yards
71	Adjustment code	Column 71 of Equipment Header Card
72-80	Equipment designation (Submarine Sonar only)	Columns 34-42 of Equipment Header Card
72-79	Equipment designation	Columns 30-37 of Equipment Header Card
80	Mode (ESM only)	A = active, P = passive
66-67	Equipment designation	Columns 30-31 of Equipment Header Card
<b>RANGE ERROR</b>		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	Sonar or GFCS operational mode. R = RDT, 0 = ODT, etc for sonar; T = auto, M = manual, etc for GFCS
67	Modification change	Sonar
68-70	Range scale	Hundreds of yards
71	Adjustment code	Column 71 of Equipment Header Card
72-80	Equipment designation (Submarine Sonar only)	Columns 34-42 of Equipment Header Card
72-79	Equipment designation	Columns 30-37 of Equipment Header Card
80	Mode	A = active, P = passive, T = two track From column 49 of Equipment Header Card

TABLE 19. (Continued)

Column	Data	Remarks
<b>PERISCOPE ALIGNMENT AND LOST MOTION</b>		
65	Type test	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 34-42 of Equipment Header Card
<b>PERISCOPE BENCHMARK ALIGNMENT</b>		
65	Type test	Column 78 of Vehicle Header Card
72-80	Equipment designation	Columns 34-42 of Equipment Header Card
<b>GUN FIRE CONTROL BENCHMARK CHECKS</b>		
65	Type test	Column 78 of Vehicle Header Card
66	Mode	
72-80	Equipment designation	Columns 34-42 of Equipment Header Card

**LIST AND PLOT PROGRAM**

This program is used to generate listings and plots for summary reports. It makes use of a deck of control cards for each equipment to identify data to be selected, to provide title and/or heading information, to list performance standards for the equipment, and to provide formatting information for printing and plotting. Figure 21 is a sample listing and figure 22 are sample plots.

The cumulative graphs show the data for the current period plotted as individual points, and the background data plotted as a line segment. The abscissa is a continuous scale representing one of the error parameters. The ordinate is a continuous scale representing cumulative percentage (ie, the parameter having the largest magnitude falls at one hundred percent on the ordinate).

The modified bar graphs show the data for the current period plotted as individual points, and the background data plotted as vertical bars. As before, the abscissa represents one of the error parameters, but is broken into discrete intervals. For the background data, the ordinate is a continuous scale representing percentage. A vertical bar plotted over an interval shows the percentage of background data falling in that interval. For current period data, the ordinate is broken into discrete points, and is dimensionless. Each point plotted over an interval represents one error value falling in that interval.

TYPE TYPE: SONAR 10.0 K RANGE SCALE PLUT TILT IS TYPE 4  
 SONAR TYPE: SONAR READOUT, SONAR MODE - BEARING DATA

RANGE REPORT	SHIP NAME	CLASS	NUMB	PVV	2.50	2.5	3	PASSED	CUML	SEQUENCED
1 639	ANY SHIP	HULL NO.	(P)	1.69	1.6	2	IN	IN	1.19	
5 159	ANY SHIP	HULL NO.	(A)	1.24	1.2	1	IN	IN	1.24	
2 555	ANY SHIP	HULL NO.	(A)	1.97	2.0	2	IN	IN	1.32	
1 636	ANY SHIP	HULL NO.	(P)	1.68	1.7	2	IN	IN	1.47	
1 649	ANY SHIP	HULL NO.	(P)	1.47	1.5	2	IN	IN	1.67	
1 642	ANY SHIP	HULL NO.	(P)	1.19	1.2	1	IN	IN	1.69	
3 313	ANY SHIP	HULL NO.	(P)	1.75	1.75	2	IN	IN	1.75	
1 637	ANY SHIP	HULL NO.	(P)	1.52	1.52	1	IN	IN	2.47	
AVERAGE OF NEW DATA 1.71					NUMBER OF POINTS IS 10					
AVERAGE OF OLD DATA 1.84					NUMBER OF POINTS IS 40					
OVERALL AVERAGE 1.81					NUMBER OF POINTS IS 50					
New Data Summary Old Data										
10 SYSTEMS CHECKED	40									
10 NUMBER IN	36									
0 NUMBER OUT	4									
100 PERCENT IN	90									
0 INVALID POINTS	0									
Cumulative Results										
10 SYSTEMS CHECKED	40									
10 NUMBER IN	36									
0 NUMBER OUT	4									
100 PERCENT IN	90									
0 INVALID POINTS	0									

Figure 21. LIST AND PLOT listing (part 1).

TYPE TYPE SONAR LO.0 K RANGE SCALE PLOT TITLE IS TYPE 5  
 SUNAR TYPE, SUNAR READOUT, SUNAR MODE - BREAKING DATA

RADING READING	SHIP NAME	CLASS NO.46	STANDARD FUK THIS SENSER IS	MID PVV		PASSED	CUMUL	SEQUENCED
				0.40	0.4			
1 639	ANY SHIP	HULL NO.	(P)	0.35	0.1	0	IN	0.91
5 129	ANY SHIP	HULL NO.	(A)	-0.34	-0.3	-0	IN	0.85
4 553	ANY SHIP	HULL NO.	(A)	-0.17	-0.2	-0	IN	0.17
1 636	ANY SHIP	HULL NO.	(P)	1.36	1.4	1	OUT	0.17
1 638	ANY SHIP	HULL NO.	(P)	0.29	0.3	0	IN	0.29
1 643	ANY SHIP	HULL NO.	(P)	0.35	0.4	0	IN	0.29
3 313	ANY SHIP	HULL NO.	(P)	0.25	0.3	0	IN	0.34
1 637	ANY SHIP	HULL NO.	(P)	0.17	0.2	0	IN	0.36
OVERALL AVERAGE		0.17	NUMBER OF POINTS IS 50		NUMBER OF POINTS IS 10 NUMBER OF POINTS IS 40			

#### NEW DATA SUMMARY OLD DATA

10 SYSTEMS CHECKED	40
2 NUMBER IN	20
2 NUMBER OUT	20
80 PERCENT IN	50
0 INVALID POINTS	0

#### CUMULATIVE RESULTS

10 SYSTEMS CHECKED	40
2 NUMBER IN	20
2 NUMBER OUT	20
80 PERCENT IN	50
0 INVALID POINTS	0

Figure 21. LIST AND PLOT listing (part 2).

TYPE TYPE SONAR 10-D K RANGE SCALE PLOT TITLE IS TYPE 6  
 SONAR TYPE, SONAR FEADOUT, SONAR MODE - BEARING DATA

RANGE REPORT	SHIP NAME	CLASS NUMB	AUG STD	PASSED	CUMUL	SEQUENCED
1 639	ANY SHIP	HULL NO. (P)	0.55	0.0	1	IN 0.38
5 159	ANY SHIP	HULL NO. (A)	0.40	0.4	0	IN IN 0.39
2 555	ANY SHIP	HULL NO. (A)	0.38	0.4	0	IN IN 0.40
1 636	ANY SHIP	HULL NO. (P)	0.55	0.6	1	IN OUT 0.48
1 638	ANY SHIP	HULL NO. (P)	0.48	0.2	1	IN IN 0.48
1 643	ANY SHIP	HULL NO. (P)	0.60	0.6	1	IN IN 0.48
3 313	ANY SHIP	HULL NO. (P)	0.56	0.6	1	IN IN 0.55
1 637	ANY SHIP	HULL NO. (P)	0.48	0.4	0	IN OUT 0.55
					1	IN IN 0.56
AVERAGE OF NEW DATA			0.49	NUMBER OF POINTS IS 10		
AVERAGE OF OLD DATA			0.51	NUMBER OF POINTS IS 40		
OVERALL AVERAGE	C.52			NUMBER OF POINTS IS 50		

#### DATA SUMMARY OLD DATA

10 SYSTEMS CHECKED	40
1G NUMBER IN	39
0 NUMBER OUT	1
100 PERCENT IN	98
0 INVALID POINTS	0

#### CUMULATIVE RESULTS

10 SYSTEMS CHECKED	40
5 NUMBER IN	20
2 NUMBER OUT	20
80 PERCENT IN	50
0 INVALID POINTS	0

Figure 21. LIST AND PLOT listing (part 3).

TYPE 4

1

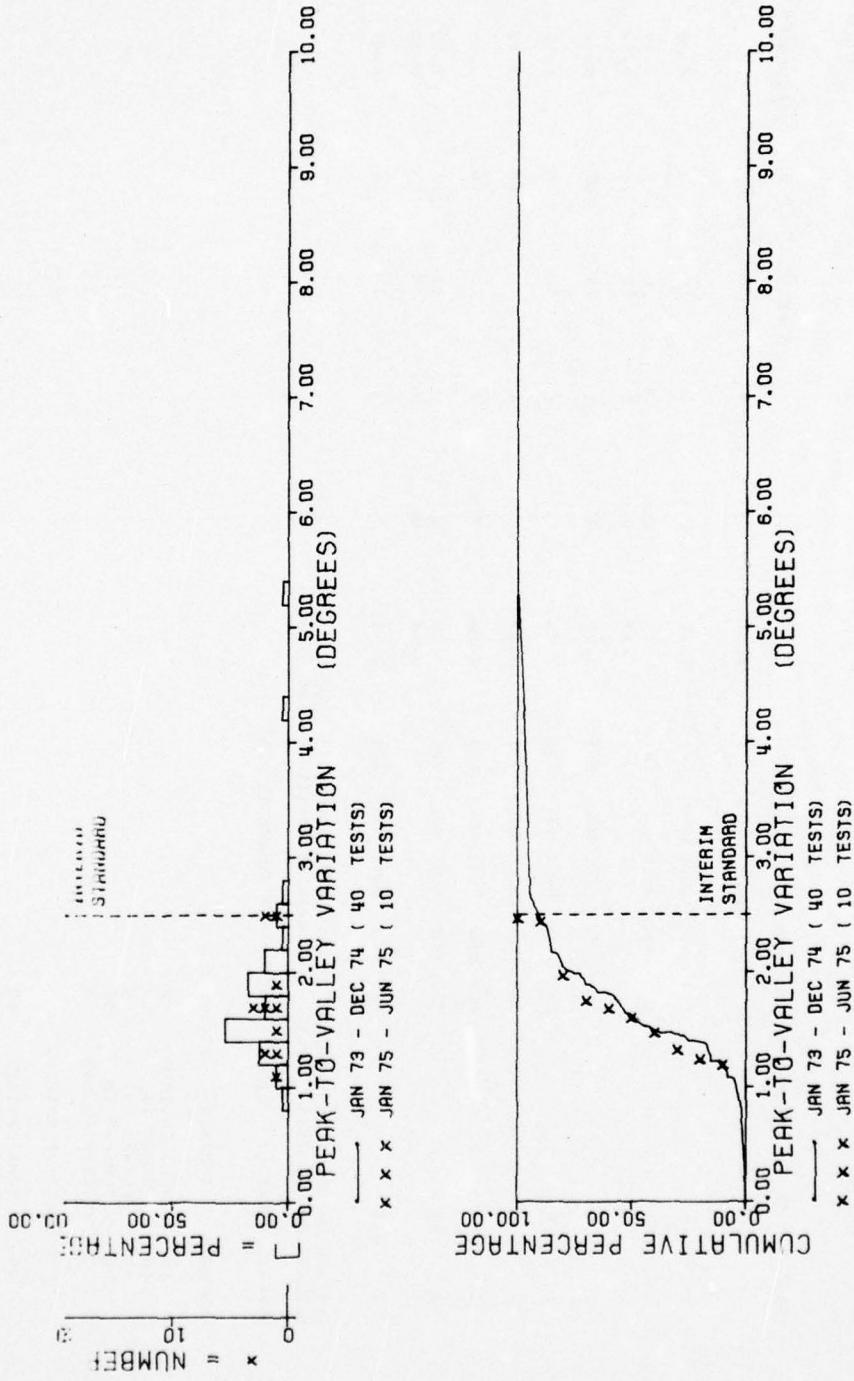


Figure 22. LIST AND PLOT sample plots (part 1).

TYPE 5

2

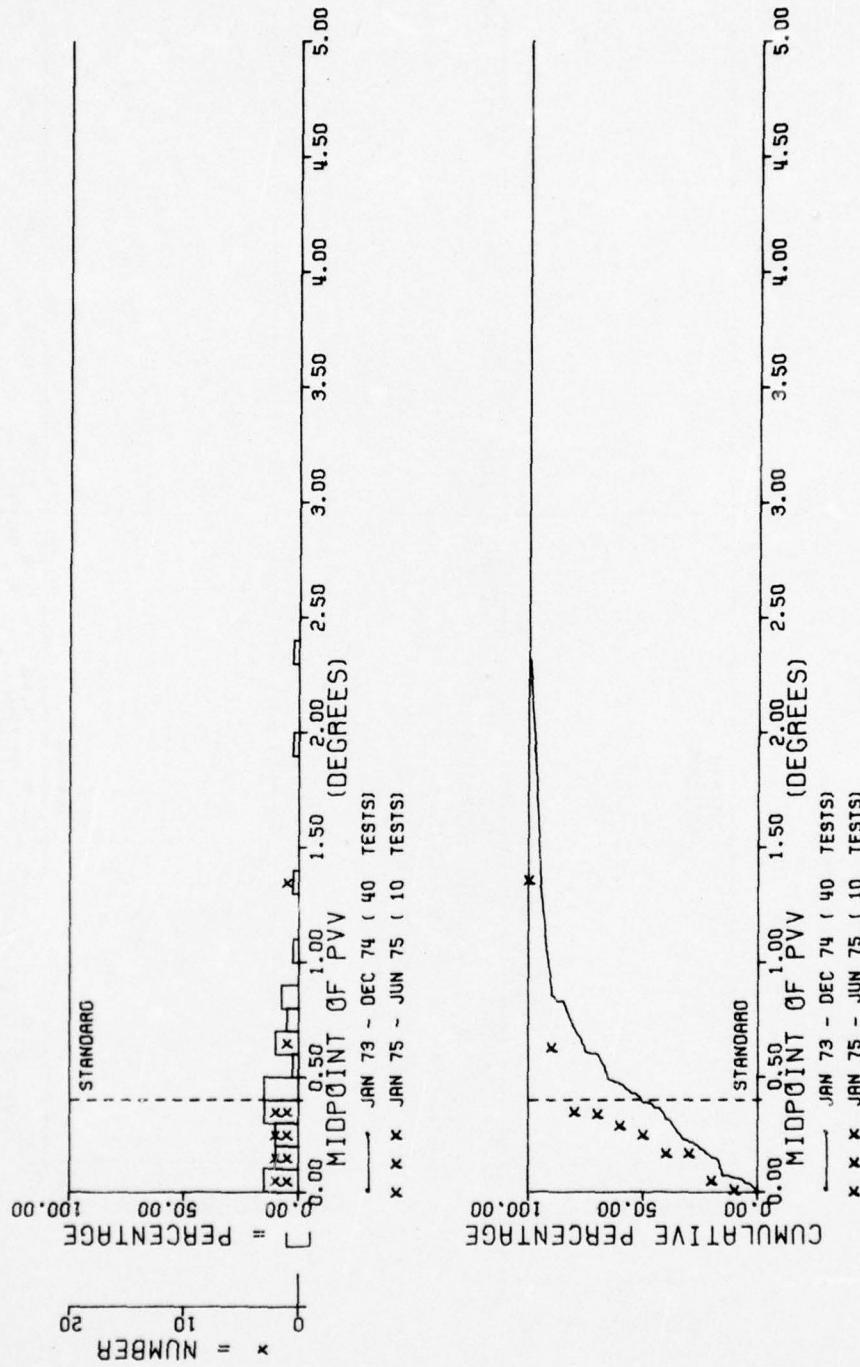


Figure 22. LIST AND PLOT sample plots (part 2).

# TYPE 6 3

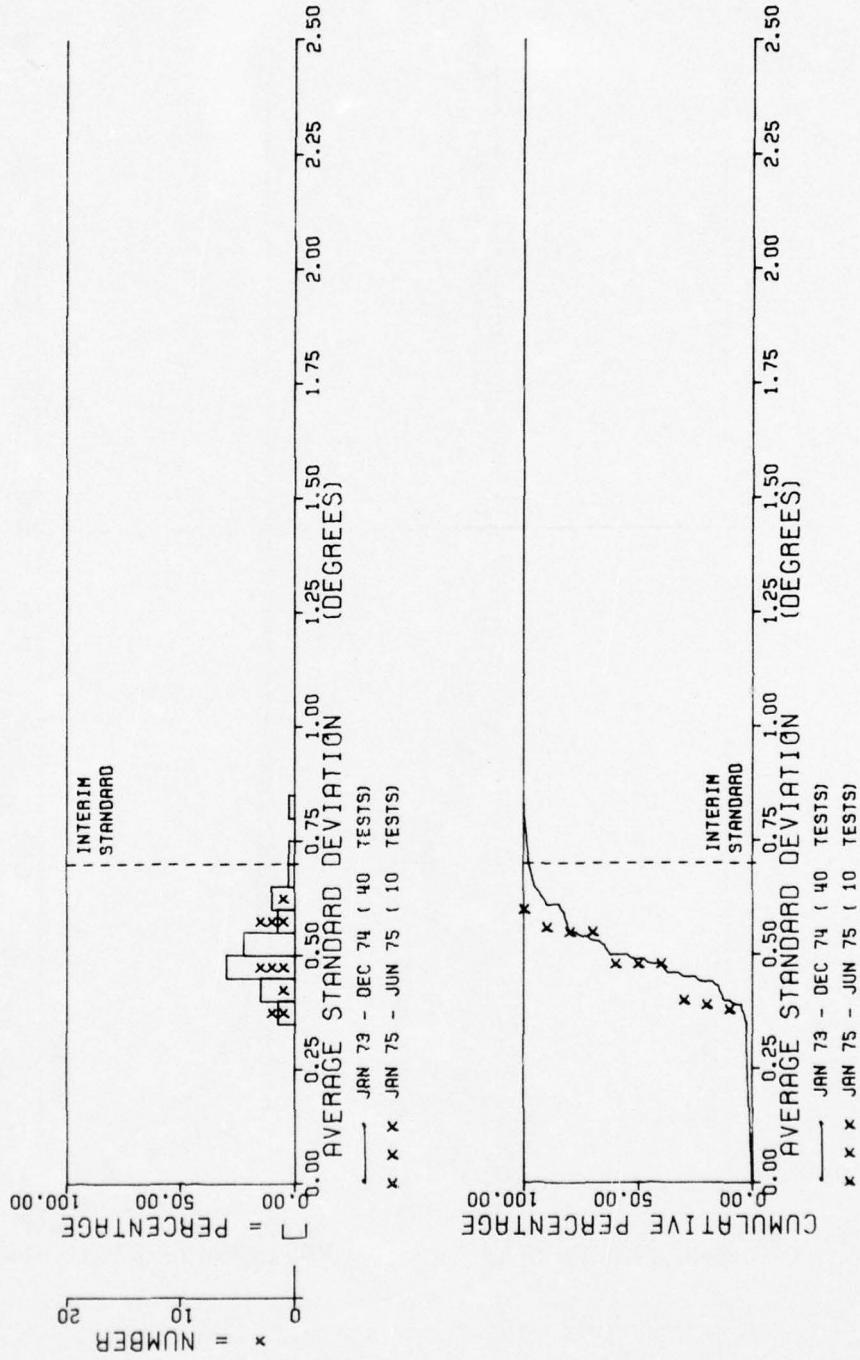


Figure 22. LIST AND PLOT sample plots (part 3).

## OTHER PROGRAMS

Other programs in the NELC FORACS library include those that can regenerate any plot, list any portion of any tape, and extract information from vehicle header cards to generate a file of range activity. Other information which can be extracted includes data on selected ships, particular sensors, and range activity by period. Sorts may be made by country and any information on vehicle or equipment header records can be transferred to tape for further analysis. Another program used for analysis is the "COMPOSITE CURVE" program.

## COMPOSITE CURVE PROGRAM

For each ten-degree bearing sector of each sensor the sensor data bank contains the number of error samples, the sum of these errors, and the sum of the squared errors. From these data, a mean and standard deviation for each bearing sector may be computed.

The COMPOSITE CURVE program permits the combined processing of many sensors to compute a single mean and standard deviation for each ten-degree bearing sector. This program outputs a listing and a plot for each set of sensors which are processed. The listing identifies each sector, the total number of points in the sector, the mean error for the sector and the standard deviation of the data in that sector. The plot shows the mean of each sector and the plus or minus one standard deviation value plotted about the mean. Figure 23 is a sample listing and figure 24 is a sample plot.

SECTOR	NUMBER	AVERAGE	STD. DEV.
-170	0	0.00	0.00
-160	0	0.00	0.00
-150	0	0.00	0.00
-140	7	2.41	1.54
-130	11	-0.15	0.21
-120	53	0.21	0.75
-110	139	0.37	0.92
-100	136	0.58	0.72
-90	124	0.50	0.87
-80	120	0.45	0.90
-70	131	0.50	0.93
-60	121	0.43	0.97
-50	125	0.45	0.85
-40	150	0.48	0.75
-30	117	0.31	0.71
-20	148	0.34	0.77
-10	183	0.50	0.75
0	232	0.46	0.77
10	155	0.47	0.69
20	140	0.53	0.80
30	137	0.45	0.72
40	141	0.46	0.96
50	146	0.61	1.04
60	147	0.61	1.00
70	142	0.51	0.85
80	148	0.66	0.80
90	130	0.57	0.81
100	125	0.42	0.87
110	154	0.56	0.81
120	66	0.71	0.83
130	13	0.19	0.44
140	13	-2.26	0.74
150	0	0.00	0.00
160	0	0.00	0.00
170	0	0.00	0.00
180	0	0.00	0.00

Figure 23. COMPOSITE CURVE plot listing.

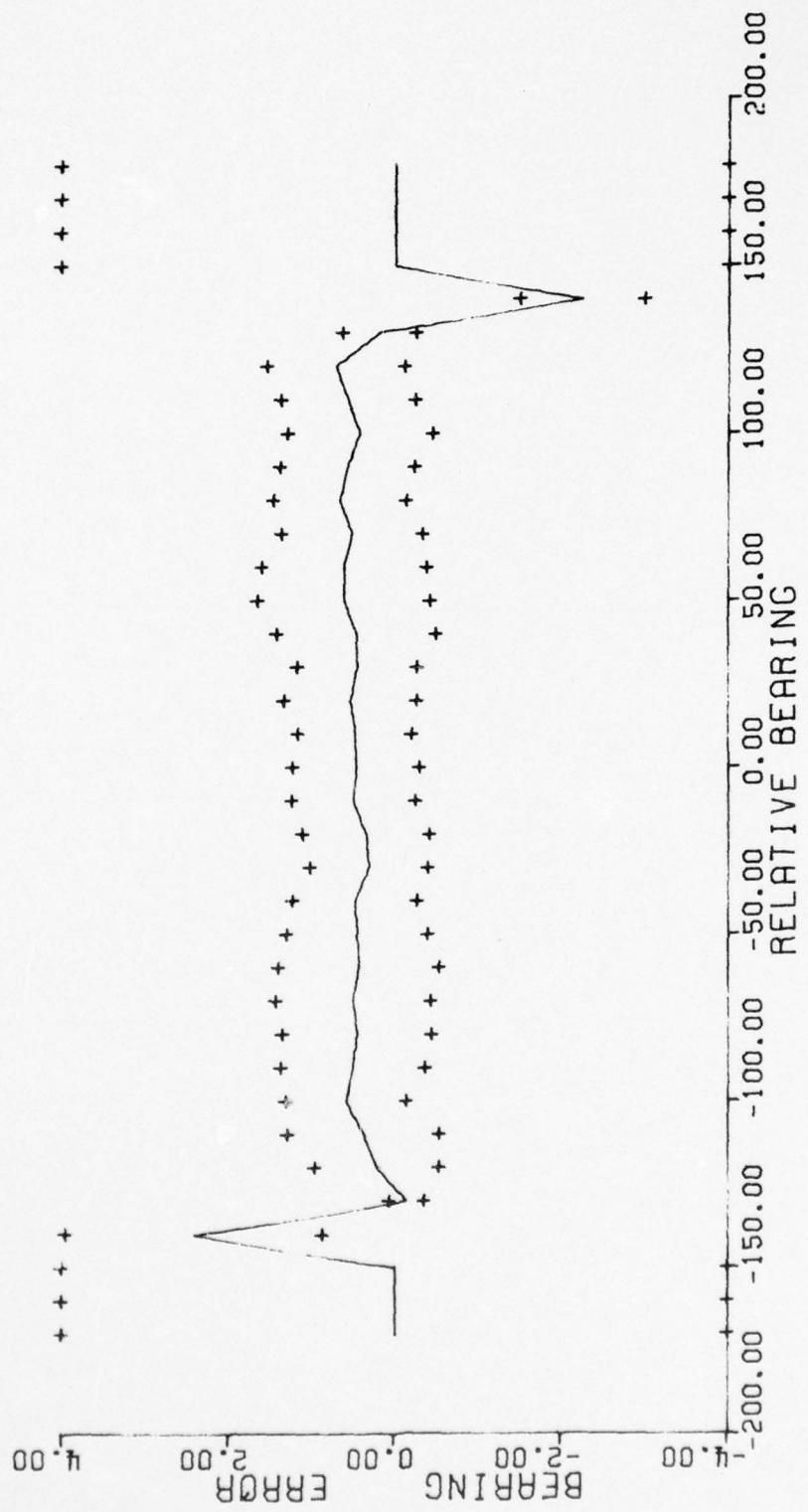


Figure 24. COMPOSITE CURVE plot.